

4033

# US 110' Subchasers In Action®

**T. Garth Connelly**





## Introduction

World War I, commonly called "The Great War" or "The War To End All Wars," introduced a new weapon system to the world: the *Unterseeboot*, or, as abbreviated in English, the U-boat. Submarines were responsible for sinking hundreds of military and mercantile vessels, and a response had to be devised. The British Royal Navy came up with numerous possible answers, including listening equipment and explosive devices that crewmen were supposed to hurl at the U-Boats.

Soon, however, a class of vessels known as "Torpedo Boat Destroyers" - later known simply as "Destroyers" - became the U-Boat's main adversary. Building a destroyer took time, however, and used materials, already in short supply due to U-Boat attacks, that were needed for the construction of other major naval vessels. A different kind of response was evidently necessary.

The answer came in the form of the United States Navy's 110-foot, wooden-hull, SC-1 Class subchasers. Small boat yards, which had experience in small-boat construction, could build these vessels. The workforce tasked with building these vessels would not need to be retrained since they already had the necessary skills. This fact meant the boats could be built and turned over to the Navy quickly in order to take to the sea and hunt for U-Boats.

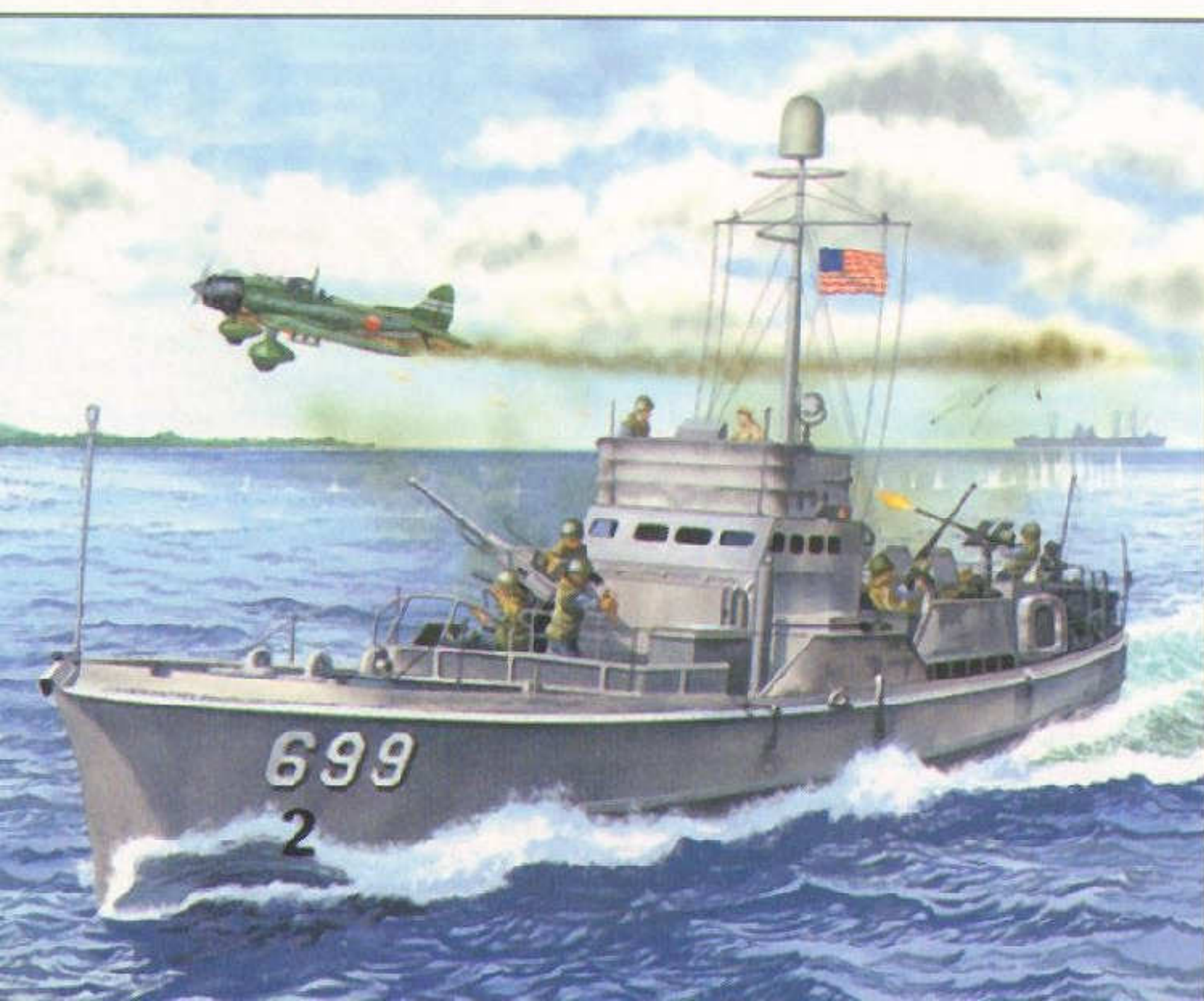
Continued on Page 4

## Dedication

To my grandfather, a veteran of World War I, and my father, a World War II veteran – men who served on the two generations of this type of vessel – and to all of the other SC Sailors out there; to Donna Lynn "Moxie" Licsak; to my best friend, Nancy L. Gregoire, who is the very definition of the word "friendship" and the embodiment of the term "a true friend;" to my dear friend Martina Montanari; and to Kelly Hedley and Amy Celli, two sisters whom I am beginning to think of as sisters.

**(Title Page)** SC-716's paint scheme has Light Gray (5-L) and Ocean Gray (5-O). (NARA)

**(Front Cover)** The SC-699, dubbed the "Shootin' 699," opens fire on a Japanese Val dive bomber in the Philippines in 1944. **(Back Cover)** Bosun's Mate John M. Connelly serves on SC-253, an SC-1 Class boat that escorts two merchant ships in European waters in 1917.



## About the In Action® Series

*In Action*® books, despite the title of the genre, are books that trace the development of a single type of aircraft, armored vehicle, or ship from prototype to the final production variant. Experimental or "one-off" variants can also be included. Our first *In Action*® book was printed in 1971.

Copyright 2009 Squadron/Signal Publications  
Printed in the U.S.A.

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form by means electrical, mechanical, or otherwise, without written permission of the publisher.

ISBN 978-0-89747-587-7

## Military/Combat Photographs and Snapshots

If you have any photos of aircraft, armor, soldiers, or ships of any nation, particularly wartime snapshots, why not share them with us and help make Squadron/Signal's books all the more interesting and complete in the future? Any photograph sent to us will be copied and returned. Electronic images are preferred. The donor will be fully credited for any photos used. Please send them to:

Squadron/Signal Publications  
1115 Crowley Drive  
Carrollton, TX 75006-1312 U.S.A.  
[www.SquadronSignalPublications.com](http://www.SquadronSignalPublications.com)

## Acknowledgements

I would like to thank the following individuals for their assistance in the completion of this book: Bruce G. "Chip" Marshall, who literally saved this book; Thomas F. Connelly; Thomas J. Connelly; John Lambert; Wayne Traxel; Theodore Treadwell; Dan Treadwell, who was of invaluable assistance to me in this project; Tracy White; Todd Woofenden; Patrol Craft Sailors' Association; Duane "Bucky" Walters; Mr. Robert Daly; Joe Radigan; Steve Tuhy, for his drawings; John Synder of White Ensign Models; Randy Short; Bruce G. "Chip" Marshall; Ms. Cassie Grant; and Al Ross, II; Ernest Arroyo, The Pearl Harbor History Associates, Inc.



# US 110' Subchasers

*Written by T. Garth Connelly*

**In Action<sup>®</sup>**



**Squadron Signal<sup>®</sup>**  
Publications

*Cover Art by Don Greer*

*Line Illustrations by Matheu Spraggins*





A 3-inch/50-caliber deck gun is mounted on the foredeck of SC-734. The man on the mast seems to be preparing the subchaser for radar installation. SC-734 was laid down on 15 April 1942, by Al Larson Boat Shop, Inc., in Terminal Island, California. On 18 July 1942, the vessel was launched, and on 28 December 1942, the boat was officially commissioned.



## SC-1 Class

In February 1917, Franklin D. Roosevelt, Assistant Secretary of the Navy, called for construction, in large numbers, of a 50-foot subchaser. His thinking was that a 50-foot hull would be the largest vessel that could be built in a relatively short time and in large enough numbers to meet a U-Boat threat. He was also fearful that building any vessel larger than 50 feet long would run into delays.

Work on both the 50-foot design and a 110-foot design began in early March 1917. Later that month, however, Commander Julius Augustus Furer, head of the Supply Division, Bureau of Construction and Repair and overseer of the subchaser project, called a halt to further work on a 50-foot vessel. The original concept design of what would result in the 110-foot subchaser was for a 105-foot hull to be built in wood and steel versions. Whereas the wooden version weighed 58 tons, the steel version weighed 52.5 tons.

The Navy wanted to have a vessel that was relatively inexpensive to produce and could meet the following General Design Board requirements:

- A small displacement
- A maximum speed of 17.5 -18 knots
- A cruising radius of 800 miles or 1,500 miles at 12 knots
- A capacity to carry fuel and supplies, known as "emergency stores," to last 15 days
- The vessel would, as conceived, be armed with the following:
- One 3-inch gun
- One 6-Pounder
- Three .30-caliber machine guns

The subchaser also would carry an extremely powerful radio, have the ability to communicate with another vessel of the same type, have a raised lookout platform, which gave access to a machine gun; and have a protected helm position.

Experience proved that designing the subchaser's hull for sea-worthiness rather than high speed was indeed more advantageous. The seaworthy qualities of the vessels were showcased when a 235-boat flotilla of 110-foot subchasers braved extremely poor weather to cross the Atlantic under their own power.

The power-plants of these vessels proved to be the hardest aspect of the design to devise. Only three U.S. engine manufacturers could make 300-horsepower engines and of these manufacturers, only the Standard Motor Company was able to supply the needed engines in the required numbers.

The U.S. Navy decided that the company's 220-horsepower engine, which was already in production, would be the power-plant for the SC-1 Class.

The first SC-1 Class subchaser to be commissioned was SC-6 on 19 August 1917, and the last SC-1 Class to be commissioned was the SC-444 on 26 August 1919. Only two of the vessels in service with the U.S. Navy, and not turned over to Italy or France, were still in service at the end of World War II, and they were the SC-412 and the SC-437.

The SC-1 Class vessels had a maximum speed of 18 knots and a crew of two officers and 24 enlisted men. A. Loring Swasey, from the Bureau of Ships, designed the SC-1 Class to meet a requirement for an anti-submarine warfare vessel. Originally, the SC-1 was to be armed with the following package:

- One 6-Pound, non-recoilless Davis gun
- Two .30-caliber Lewis or Colt machine guns

Drawing from the experiences of Gloucester, Massachusetts fishermen, Swasey designed a hull that resembled a whaleboat with a transom stern. The keel he incorporated into the design increased hull drag by 10 percent but made the boat a more stable gun platform and helped keep it on course in a following sea. The vessel's maximum draft was 5 feet, 8 inches.

Thanks to its design, the SC-1 Class was very seaworthy, as was demonstrated by the 235 boats of that class that sailed on their own keels and under their own power across the Atlantic, some vessels experiencing the extremely bad weather for which the North Atlantic is known.

The U.S. Navy recognized the need for a subchaser after two German U-Boats visited the Eastern seaboard and then went back out to sea and sank five ships. Roosevelt endorsed plans for anti-submarine vessels with:

- A length of 110 feet
- A length at the waterline of 105 feet
- A beam of 14 feet, 8.75 inches
- A beam over the guard rails of 15 feet, 5 inches
- A displacement of 85 tons

Three six-cylinder gasoline engines, manufactured by the Standard Motor Company, powered the boat's three propellers. The engines, directly connected to the three-propeller shafts, were rated at 220 horsepower at 500 r.p.m, and they had an air compressor that provided compressed air when starting and reversing. The individually-cast cylinders were mounted on an open-base crankcase. Bosch waterproof magnetic spark plugs with low tension wiring supplied the ignition. Four tanks located forward of the engine room and under the officers' quarters held 2,500 gallons of fuel. The SC-1 Class had one two-cylinder, 10-horse-power gasoline engine that ran a 4.5-kilowatt generator and a bilge and fire pump. The propellers of the SC-1 Class were 39 inches in diameter and had a pitch of 57.5 inches.

The proposed armament on the SC-1 Class was as follows:

- One 3-inch/23-caliber cannon on the fore-deck.
- Two Browning .30-caliber machine guns on each Bridge wing.
- One "Y"-gun Depth Charge Projector (DCP) that fired two 300-pound depth charges at the same time.

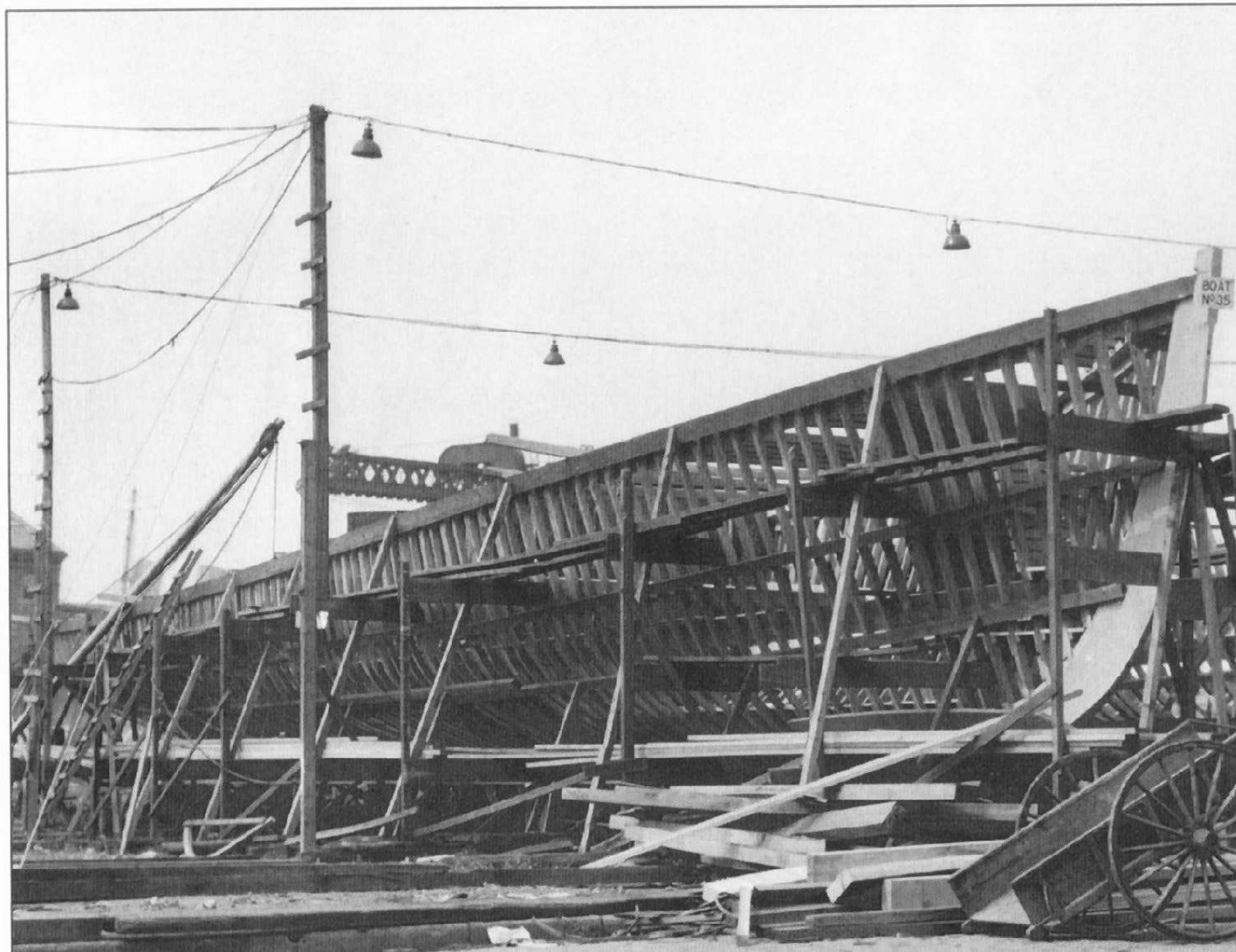
Between steel bulkheads, located under the vessel's Y-guns, was a magazine designed to store 100 rounds for the Poole gun, 50 rounds of three-inch shells for the Y-guns, 200 rounds for two Lewis or Browning machine guns, and twelve 300-pound depth charges. Another dozen depth charges were loaded in two racks located on the deck at the stern. Each rack held six depth charges.





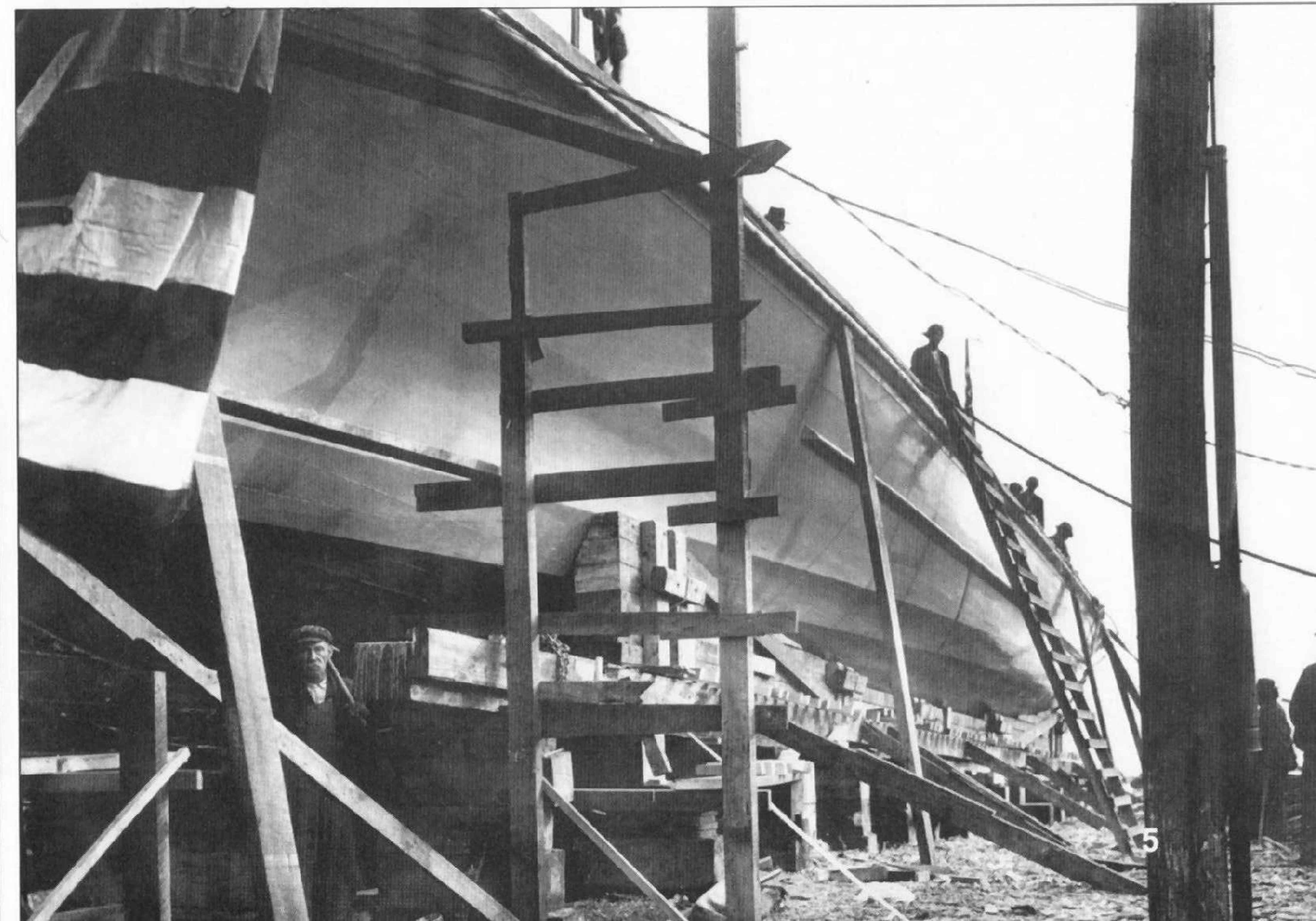
Workers experienced in building wooden craft turned out many early SCs. (NARA)

This SC-1 Class is being built for use in World War I (WWI). (NARA)



The SC-20, an SC-1 Class boat, is being fitted out. (NARA)

One shipyard that made subchasers (SCs) was in Quincy, Massachusetts. (NARA)

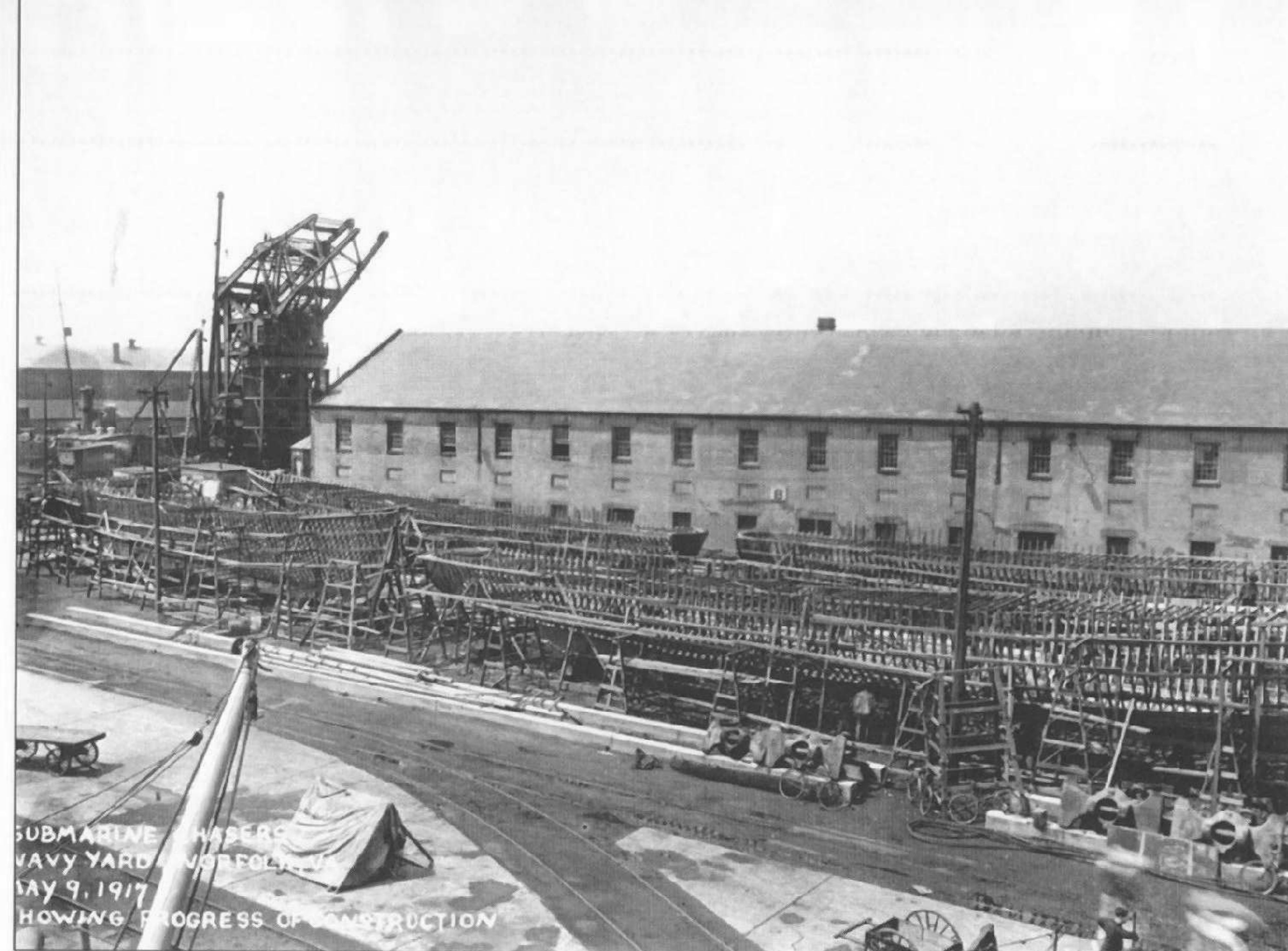






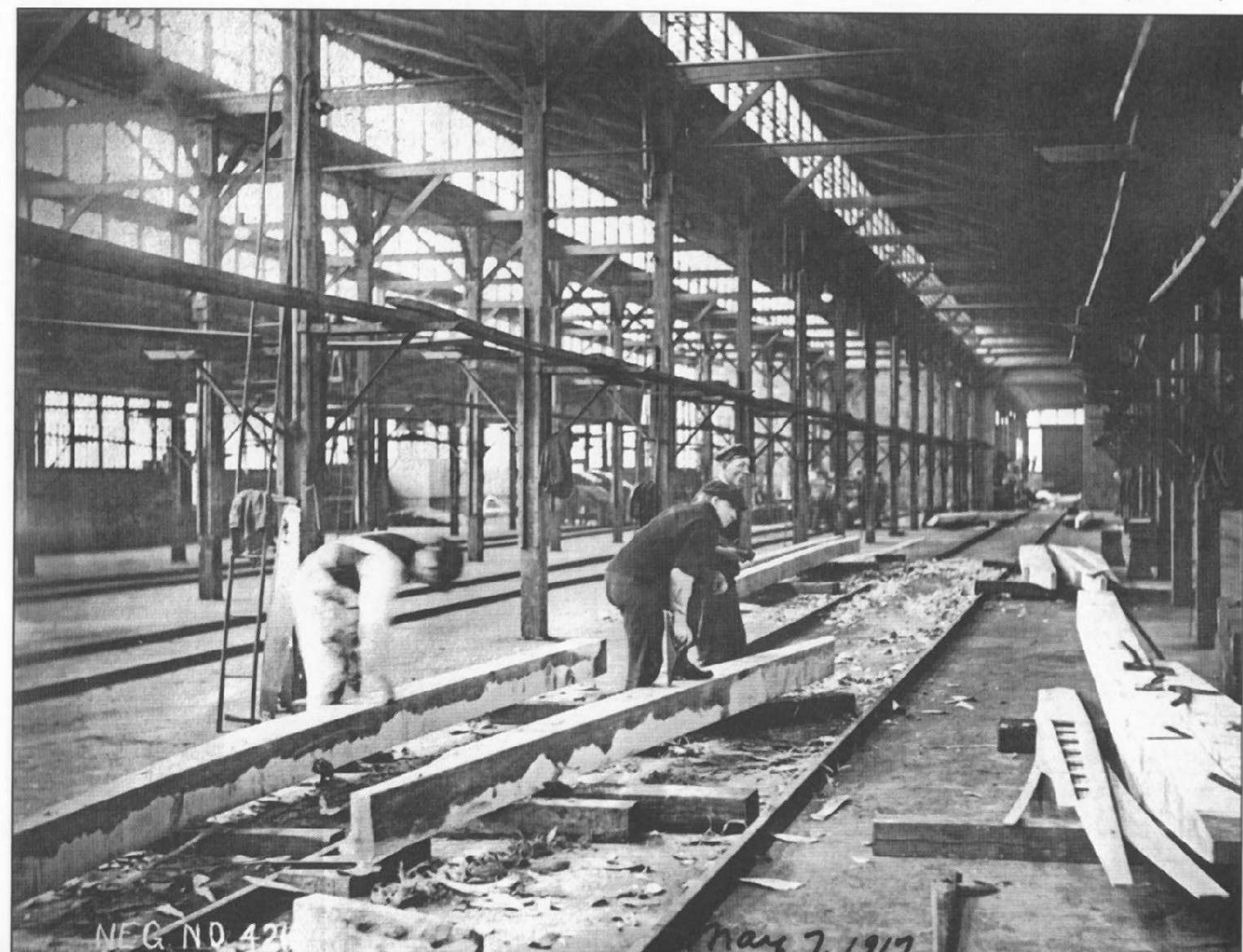
Features derived from Gloucester fishing boats helped make SCs seaworthy. (NARA)

The SC-23 has begun to take on a finished look. (NARA)

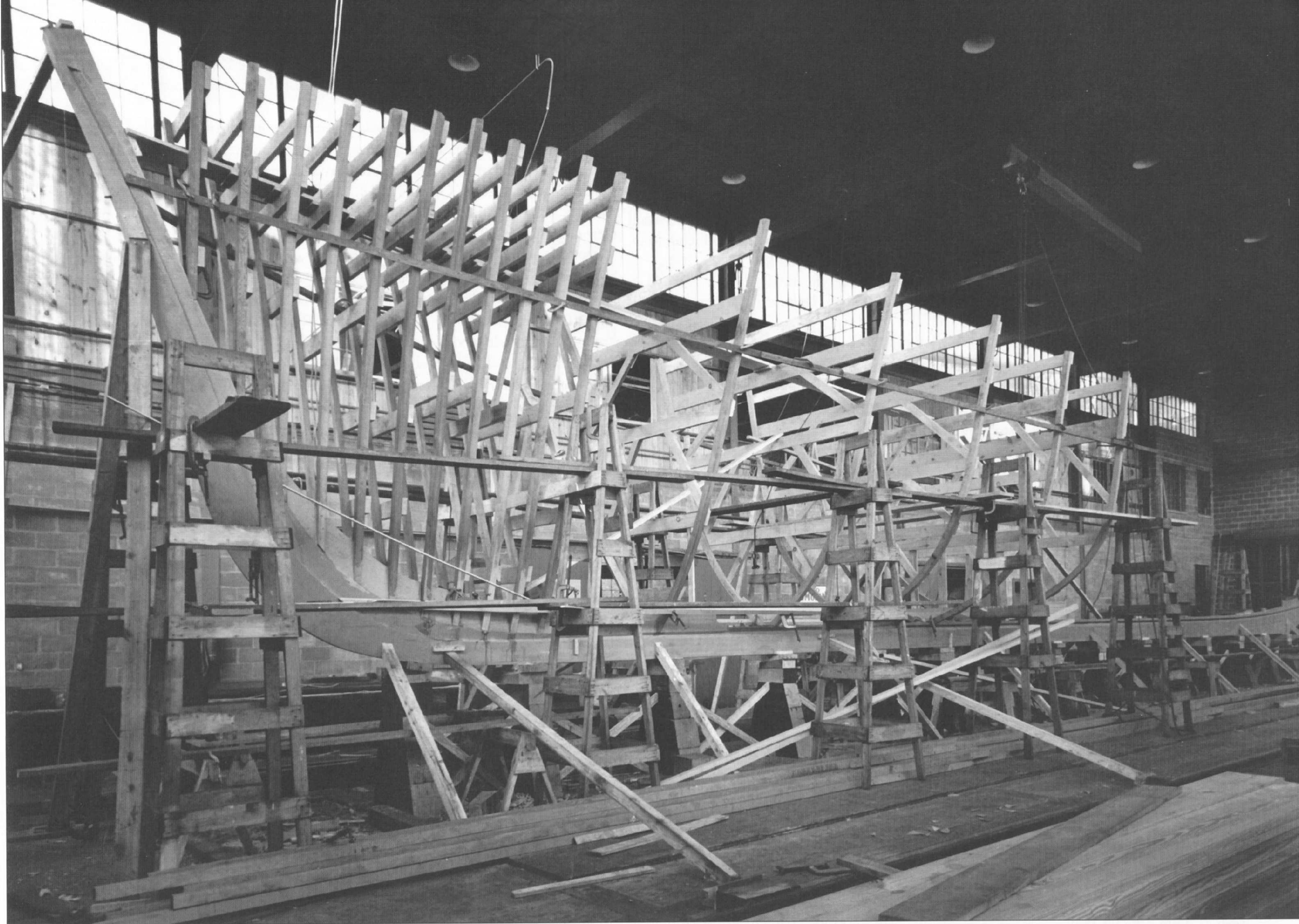


The SC-218 is among a group of subchasers under construction in 1917. (NARA)

Workers build an SC, 31 days after the U.S. declared war on Germany in 1917. (NARA)







The experimental SC-453, which was to become the prototype of the next generation of subchaser, was built by Fisher Boat Works in Detroit, Michigan, in 1938.



## WWI Armament

The two bridge wing-mounted guns were .30-caliber machine guns. They were designed in 1911 by Isaac Newton Lewis, a U.S. Army Colonel. Lewis's design was based on an earlier gun that had been devised by Samuel McLean. The .30-caliber was an air-cooled weapon with a circular, 47-cartridge magazine mounted on its top. Later on, the gun was developed for use on aircraft and the capacity of its magazine was then increased to 97 cartridges. The gun's rate of fire of 500-600 rounds per minute could be regulated by an adjustable clock-type recoil spring. By 1916, about 50,000 examples had been produced. The gun was 50-inches long, weighed 26 pounds, and had a muzzle velocity of 2,450 feet per second.

The 3-inch/23-caliber, Mod 0 Poole deck gun, mounted on the foredeck of the SC-1 Class boats, was first designed in 1900 and entered service in 1913. The gun had a range of 8,800 yards.

The U.S. Navy's first depth charge, the Mark I, was designed in 1916, and it entered service the same year. The Mark I weighed 200 pounds and carried a 50-pound explosive charge. It could be set to detonate at depths between 25 and 100 feet. Launched from a Y-Gun, the depth charge would separate into two sections, the first section was a float that released a cable to the sinking explosive section. Discoveries found this charge to be too complicated, and its explosive was too light to be effective.

The Y-Gun could launch two depth charges simultaneously. The charges were secured to the ends of plungers that fit the bore of the firing mechanism and were fired along with the depth charges. The charges were fired in the following manner: a blank, 3-inch shell was inserted into the breech at the intersection of the two barrels and was fired by pulling a lanyard. The charges were thrown out to a distance of approximately 50 yards.

The next depth charge, the Mark II, weighed 420 pounds and had an explosive charge of TNT that weighed 300 pounds. The charge sank at a rate of six feet per second and could be set to detonate at depths between 50 and 200 feet. Developed from a British Royal Navy model with an improved fuse mechanism, it was the United States' first hydrostatic depth charge.

An improved pistol and booster mechanism enhanced the depth performance of the Mark III. Weighing 420 pounds with a 300-pound TNT explosive charge, the Mark III had a sink rate of six feet per second and could be set to detonate at any depth between 50 and 300 feet.

The Mark IV entered U.S. Navy service in 1918, and it was the last depth charge to be added during World War I. Its total weight was 745 pounds, and the Mark IV had a 600-pound explosive charge of TNT. Its sink rate was six feet per second, and it could be set to detonate at any depth between 50 and 300 feet.

Like the PT boats of World War II, the SCs of World War I, had commanding officers who were rich, young men with Ivy League college educations and experience with yachts. The crews of the SC-1 Class boats in World War I also had the close-knit "family" feeling of the World War II SC-497 Class PT boat crews. Since duty on the relatively small boats was seen as more difficult than it was on capital ships, such a close-knit "family" feeling among

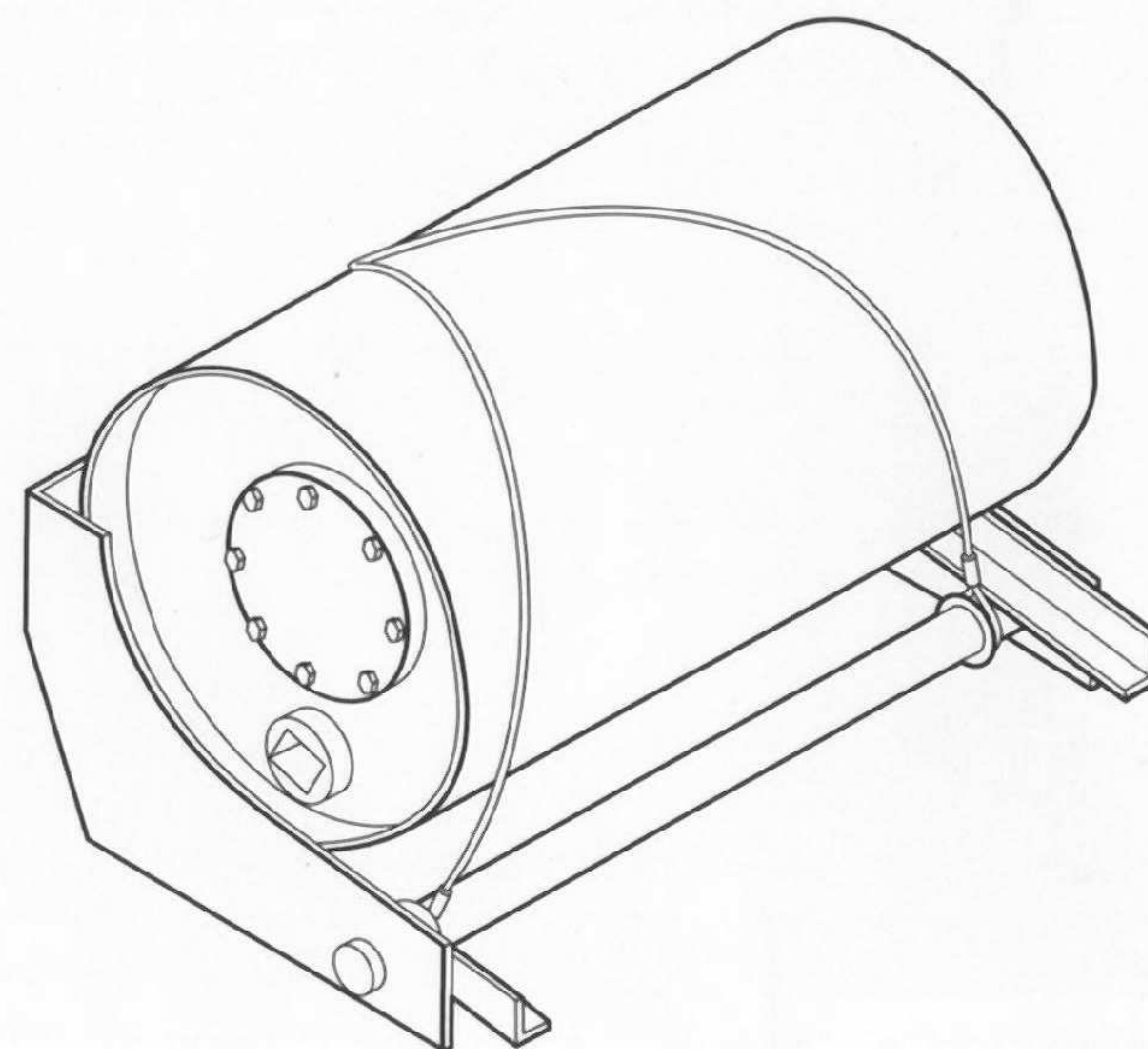
crew members was particularly needed. Also, as with the PTs and SCs of World War II, the crews on the SC-1 Class boats - officers and enlisted men alike - came from the ranks of the Naval Reserve.

These vessels saw service off Russia's northern port of Arkhangel'sk and in the Otranto Barrage operation in the Adriatic, where they sought to keep German and Austro-Hungarian U-Boats caged up in their Adriatic seaports and unable to reach the open sea to sink more Allied shipping. Also, in October 1918, 11 subchasers cleared mines in the harbor of Durrës, Albania, a city that the Austro-Hungarians had occupied and used as a port from 1916 until their departure in 1918.

By November 1918, 153 SC-1 Class boats were operating in Europe. Fifty of these were based in Plymouth, England; 30 were stationed at Corfu in Greece; and 18 were based at British Gibraltar. Twelve boats were based in Brest, France; 14 were based in Portugal's Azores; and 10 were operating out of the northern Russian port of Murmansk. When the boats operated in the Mediterranean, they hunted U-Boats in groups of three arranged in line-a-breast formations. The method used to detect a submarine was to take cross-bearings on the sounds generated by the U-boats and then to triangulate on the bearings. In a normal attack, they used patterns of 18 depth charges to destroy a target. The boats that were based in the southern Italian city of Otranto took part in the bombardment of the Austro-Hungarian naval base in Durrës, Albania, on 2 October 1918.

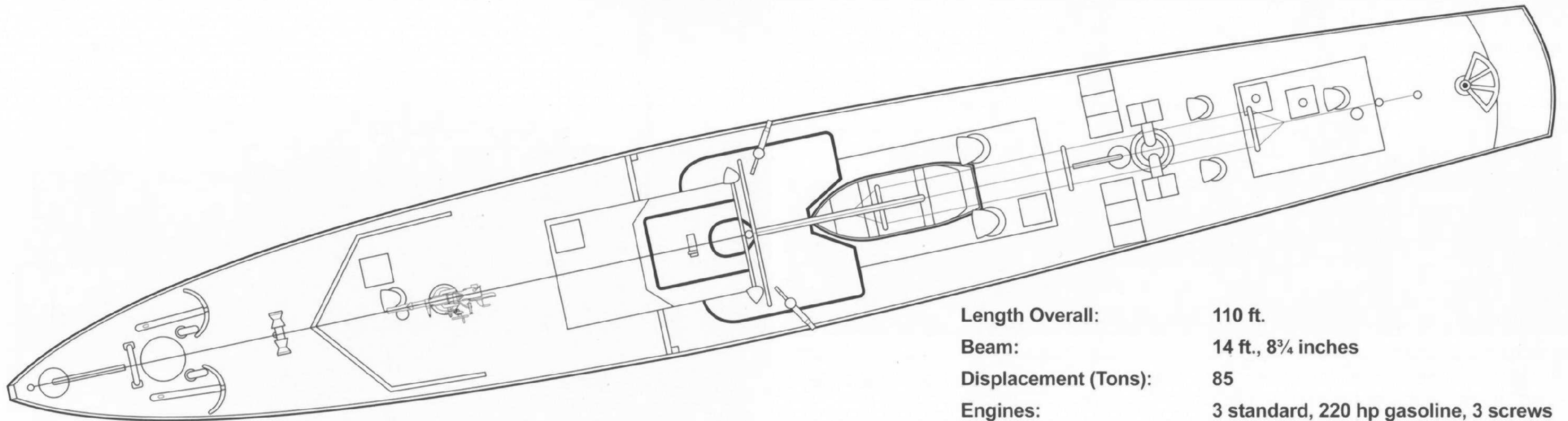
(Continued on Page 10)

## Mark IV Depth Charge

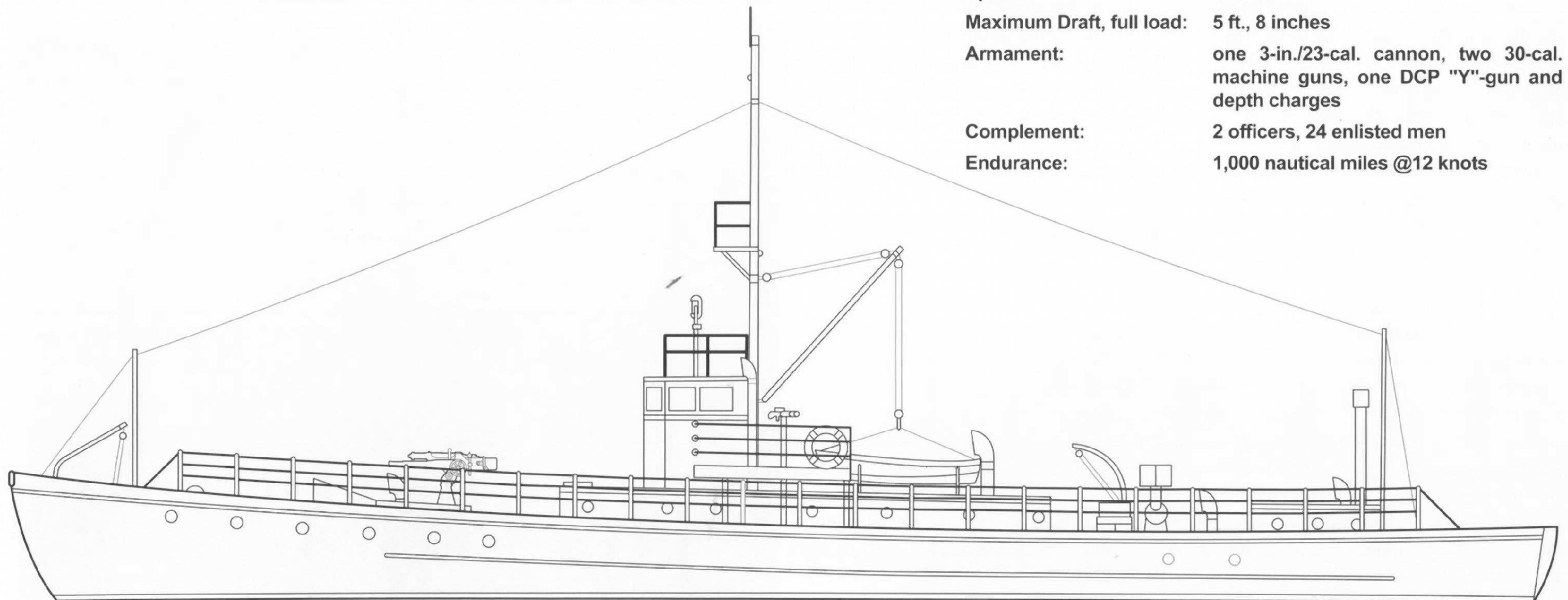




## SC-1 Class



<b>Length Overall:</b>	<b>110 ft.</b>
<b>Beam:</b>	<b>14 ft., 8<sup>3</sup>/<sub>4</sub> inches</b>
<b>Displacement (Tons):</b>	<b>85</b>
<b>Engines:</b>	<b>3 standard, 220 hp gasoline, 3 screws</b>
<b>Speed:</b>	<b>18 knots</b>
<b>Maximum Draft, full load:</b>	<b>5 ft., 8 inches</b>
<b>Armament:</b>	<b>one 3-in./23-cal. cannon, two 30-cal. machine guns, one DCP "Y"-gun and depth charges</b>
<b>Complement:</b>	<b>2 officers, 24 enlisted men</b>
<b>Endurance:</b>	<b>1,000 nautical miles @12 knots</b>





After the end of World War I, 150 SC-1 Class boats were transferred to the French Navy, and 53 of the type were turned over to the U.S. Coast Guard, which used them in the campaign against alcohol smugglers during Prohibition. The boats, which were not built for speed, were found to be too slow for effective interdiction of smuggling, however. SC-1 Class boats were sold to the general public as yachts, into the mercantile fleet as fishing boats, and some even were used as banana boats. Other Navy SC-1 boats served as training craft at the Naval Academy in Annapolis, and some served as Survey Vessels. A number of boats, like the SC-159, were used as air-sea-rescue boats after World War I. The SC-159, based in Charleston, South Carolina, served in this role from 1921 to 1926.

The SC-223, which was built at Morris Heights, New York, was placed in service in December 1917, saw action in World War I, returned to the United States after the Armistice, and then saw action in Haiti in 1919. Decommissioned in December 1922, she was soon assigned to Survey Duty in Cuba, along with the USS Hannibal. In the mid-1930s she was loaned to the city of Baltimore, Maryland, stricken from the Navy Register in August 1935, and sold in March 1936.

Because they were made of wood, the boats could easily fall into disrepair, and by 1922, only 40 of the original boats built for the Navy were still in commission. By April 1945, only a few of the SC-1s – including the SC-412 and SC-437 – were still on the U.S. Navy's roster.

The SC-64 served in World War II from April to December 1942, after which time, she was converted into a water barge before being sold off in March 1943. The SC-102, which was the only SC-1 Class boat to be armed with a Y-Gun, served throughout World War II before being disposed of in March 1947. The SC-330 served from 1 January 1940 until 18 April 1945, very close to the end of the war. The SC-412 served in World War II from 1 April 1941 to 2 July 1945, and SC-437 was placed into service in October 1940 and finally decommissioned on 28 June 1945.

During World War II, the U.S. Coast Guard operated four of the SC-1 Class. Under the control of the Coast Guard, these four boats were designated as follows:

- SC-229 became the USCGC Boone (with an unknown WPC hull number).
- SC-231 became the USCGC Blaze, WPC-336.
- SC-238 became the USCGC Bowstring, WPC-365.
- SC-258 became the USCGC Belleville.

The Coast Guard used these vessels in a number of roles, including patrol and anti-submarine warfare duties. A photo of the former SC-258 (the USCGC Bellville), taken in 1942, showed her with two Mark XX "Mousetrap" anti-submarine weapons (a kind of rocket-propelled depth charge), a 3-inch/23-caliber gun, and 20mm Oerlikon guns.

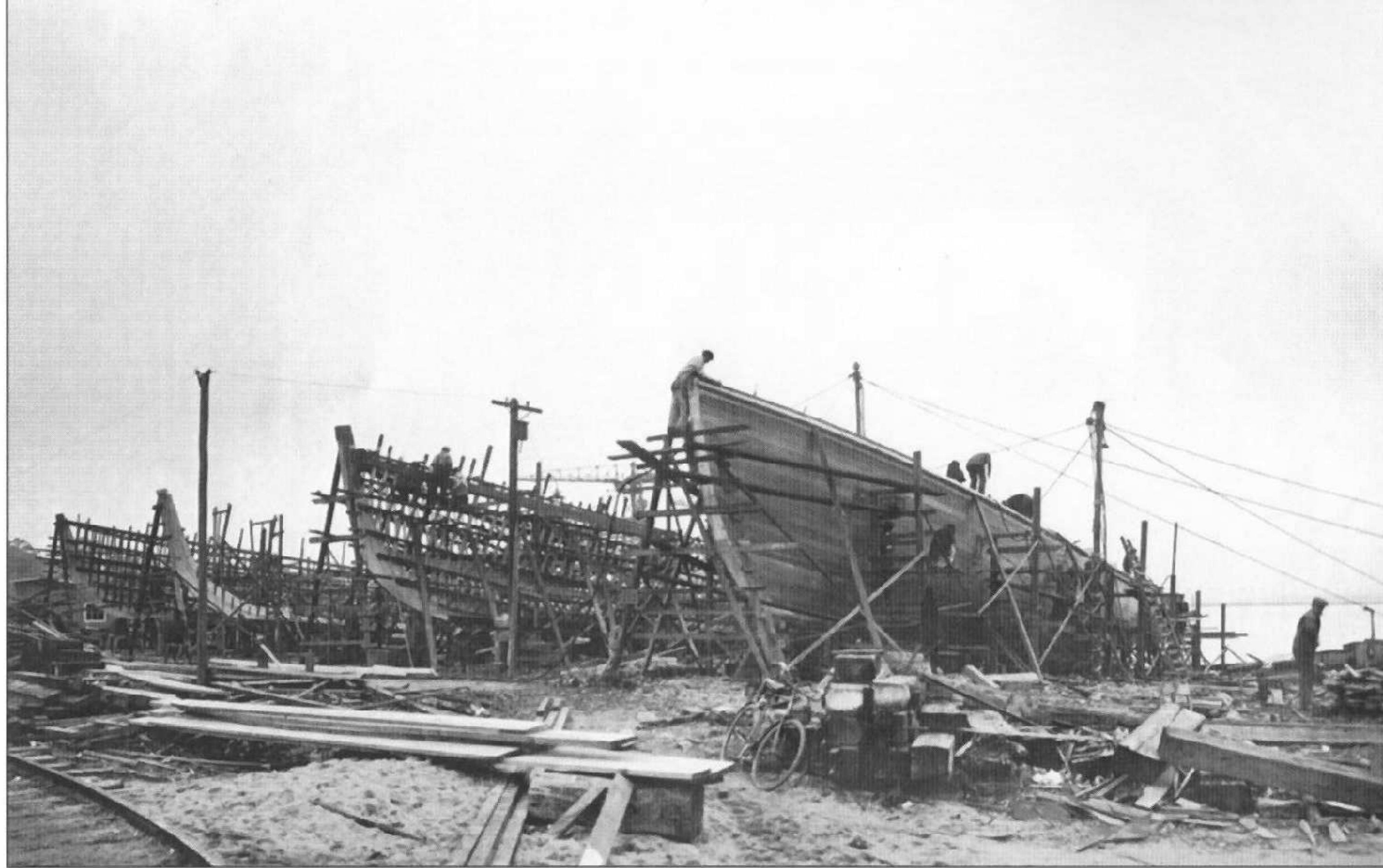
During the mid-1920s and especially in the 1930s, Germany started to rearm. Part of its weapons program was the construction of a new generation of U-boat. Seeing a new threat on the horizon, the U.S. Navy began to feel a need to modernize and augment its meager anti-submarine warfare capabilities and assets. As a result and as with the PTs, the Navy put out a specification for a modern subchaser that would be a follow-up to World War I's SC-1 Class. The winning design became known as the SC-497 Class.



SC-412 as she appeared in WWI (above) and as she appeared in WWII (below). (NARA)







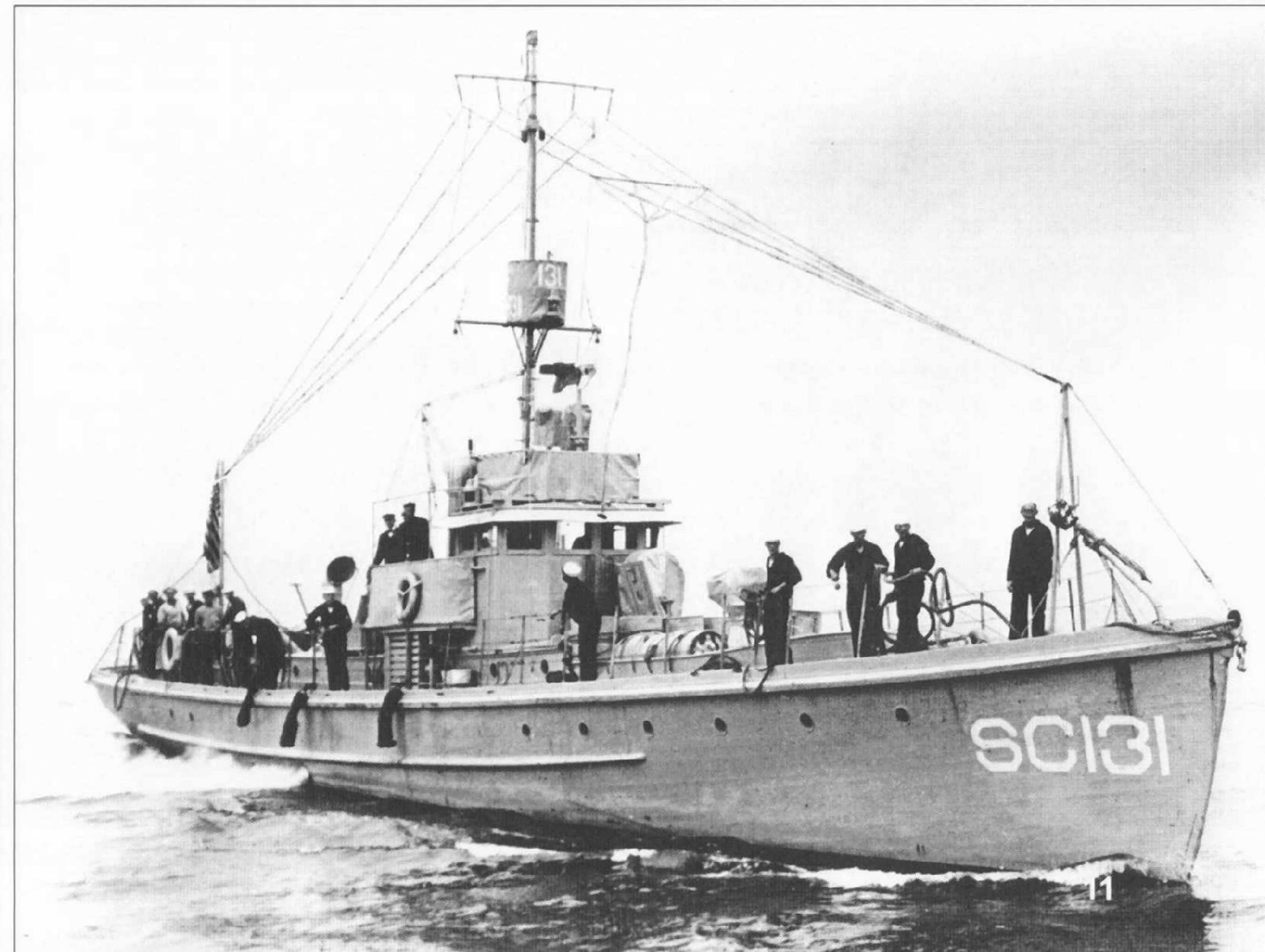
SCs are under construction in the shipyard at Quincy, Massachusetts. (NARA)

U.S. soldiers and sailors crowd the deck of this SC on a visit to an Allied port. U.S. submarine chasers saw action in waters around Europe - from the Arctic to the Adriatic - during WWI. (Author's collection)



The caged masts of a battleship can be seen in the background of this group of WWI subchasers in a U.S. port. (NARA)

SC-131 is running at a cruising speed. Her "grimy" appearance is typical of all small combatants in every war. (NARA)





# The SC-497 Class Subchaser of WWII

The new generation of subchasers were originally designated as Patrol Craft (PCs), rather than SCs, but at some point after the start of World War II, the Navy decided to differentiate between the two types of subchaser (the 110-foot wooden-hull SCs and the 173-foot steel-hull PCs) and redesignated the 110-foot wooden-hull vessel as the SC.

As early as 1937, the U.S. Navy realized that it would have to be involved in another war and as such, needed an answer to the threat of the Kriegsmarine's U-Boat menace. The Navy set out to have a "wooden hull submarine chaser that can be constructed in five to eight weeks on a quantity production basis for use in coastal and harbor waters and in protection of Fleet anchorages."

Franklin Roosevelt, now the U.S. President, saw the need for a stop-gap answer to the U-Boat that could be built in a relatively short time. The wooden-hull subchasers would provide that stop-gap because they could be built quickly in small boat yards. Steel was on allocation for capital ships, aircraft, and military vehicles such as tanks and armored vehicles, so it was hard to acquire for smaller vessels. By 1939, only one official anti-submarine vessel existed for the entire Eastern seaboard of the United States - the U.S. Coast Guard Cutter Dione. At that time, the U.S. Navy was improvising with what was called a "hooligan navy," which consisted of yard patrol craft, motor launches, and privately-owned yachts and trawlers.

In December 1937, a study authorized by Admiral William D. Leahy began the process of deciding on a new design for the 110-foot wooden-hull subchaser. Starting with a statistical data review on the World War I boats, the study concluded a 120-foot vessel was necessary.

The study also proposed armament for the new subchaser. Extrapolating from the thickness of metal on an enemy submarine's conning tower, the study named some guns that the vessel should carry. The following guns were named:

- The 1.1-inch anti-aircraft gun
- The 3-inch/23-caliber gun that was on board the World War I boats
- The 3-inch/50-caliber gun
- The 6-pounder (a 57mm gun)

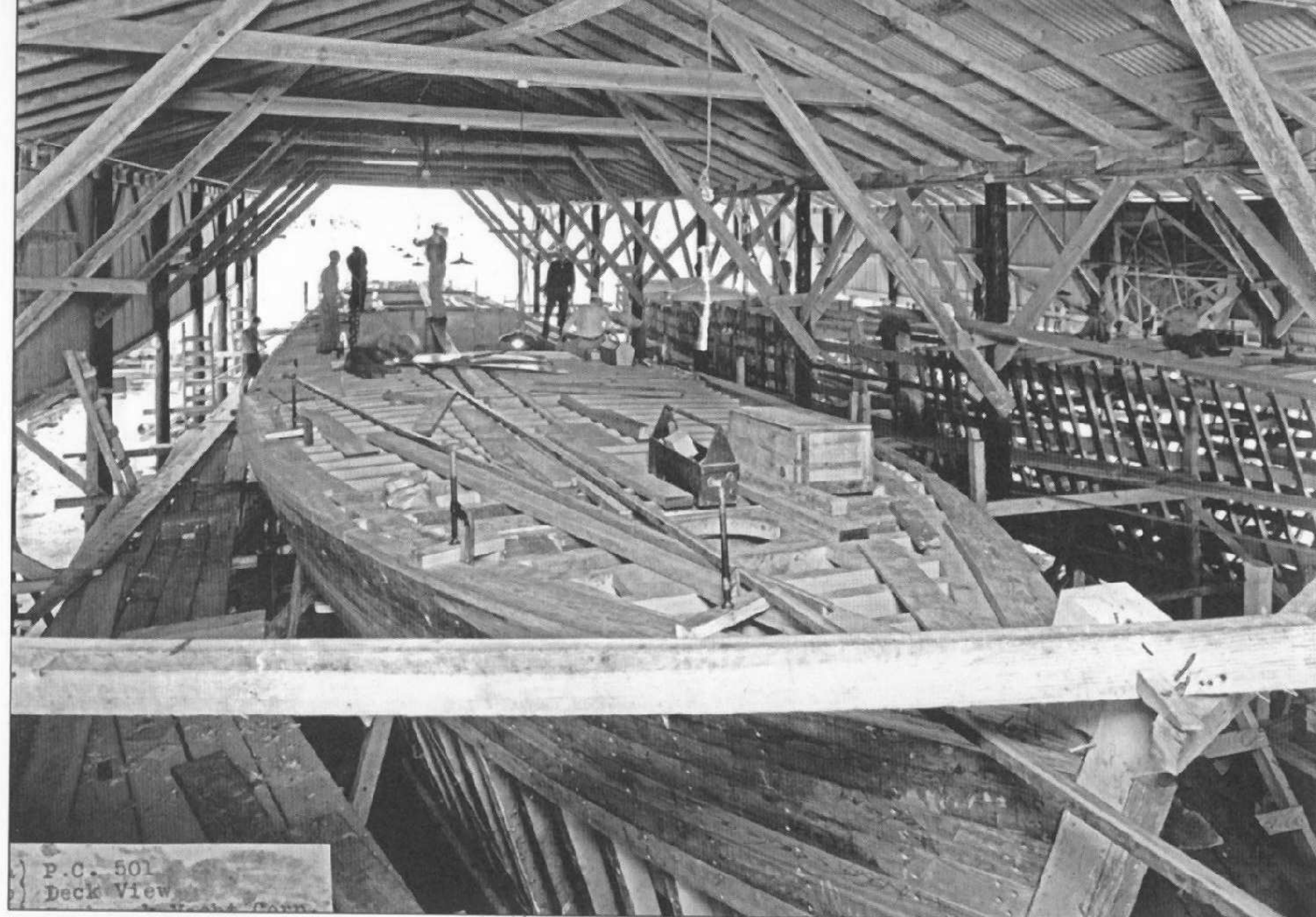
The 1.1-inch gun was dismissed, however, because the weapon lacked a single mount.

Originally, eight companies took part in the design competition for the 110-foot wooden-hull subchaser design. Luders and Elco won the competition, and the Navy decided features from both of their designs would be combined into one design. Elco drew up the lines, and Luders built the boat, dubbed the SC-449, which was powered by two C.B. EN-8 engines.

The SC-450, built by American Car and Foundry; and the SC-453, an adaptation of the World War I SC-I class, joined the SC-449 as experimental designs. The Navy tested all three and decided that the SC-453 would be the prototype for the next generation of subchaser.

Although it superficially resembled the old SC-1, the new design incorporated a number of improvements. Its beam was increased for greater stability, and its hull lines near the stern were flattened for better performance at top speed. The new design was powered by new "Pancake"-type diesel engines that generated more power than the old boats' three gasoline-

(Continued on Page 14)



Archive photos identify this vessel under construction as PC-501. The PC designation was later changed to the subchaser (SC) designation. The Seabrook Yacht Corporation built this vessel in July 1941, prior to the U.S. entry into World War II.

The port side of the PC-501 appears in this photograph taken at the Seabrook Yacht Corporation lot in January 1942.







Subchasers conducted various missions between the World Wars. The SC-223 appears here with no armament and towing what appears to be a floating gunnery target. (NARA)



fired engines. The new design featured only two propellers, whereas the SC-1 Class had three propellers. Because the new design weighed more, steel reinforcements were fitted on the hull amidships to support the added weight. Another change from the SC-1 Class was the construction of the SC-453 wheelhouse from aluminum rather than wood.

The SC-449 was designed by Elco and built by Luders Marine Construction Company. The SC-450 was built by the American Car and Foundry Company, and it mounted two depth charge racks on her stern, and a 3-inch/23-caliber gun. Neither of the two boats shipped a Y-Gun, however. Unlike the SC-1 Class, these two experimental designs were diesel-powered and not gasoline-fired. Although these two boats, in addition to the SC-453, were an improvement over the SC-1 Class, they were not a great success. They were discovered to be too slow and too lightly armed to deal with modern enemy submarines.

The SC-449 went on to serve as a training vessel until January 1945, when she was used in a top-secret experiment. In December 1944, this SC was put into dry-dock and started a transformation. Her flying bridge, mast, guns, depth charges, "Mousetraps," ready boxes, and racks were removed. She was then "rebuilt" to resemble an Escort Carrier (known as a CVE). This change occurred by giving her a flight deck that had three wooden dummy aircraft, a fake starboard superstructure, and a camouflage scheme.

Misdirection was the aim of the experiment. The idea was to put decoy vessels in the ocean to trick the Japanese into thinking the decoys were the U.S. invasion fleet massing for a landing on the Japanese home islands. The U.S. command wanted the Japanese to take the bait and transfer forces to meet the "threat" posed by the fake fleet, which was away from where the landings really were going to take place. It turned out, however, that the conversion made the 449 somewhat unseaworthy. In winds faster than 10 knots, the boat would roll over to a dangerous angle, and the recovery time from the roll was so slow that capsizing was a danger. Even though her sea trials as a mock CVE were considered a success, the Navy determined that larger vessels would be better suited for the job.

## Powerplants

The new subchaser program was almost cancelled before it could get off the ground. What saved the test program was the General Motors "Pancake"-type engine placed into a revised hull design, creating the SC-497 and hence, the designator of the class. The "Pancake" engines were able to develop twice as much horsepower as the General Motors' standard diesel engines, with the pancake engine being rated at 2,400 horsepower (as compared with the 1,200 horsepower of the 8-268A). These new engines gave the boats a top speed of 22 knots over the previously achieved 17 knots. The reason for a revised hull was the "Pancake" engine's design.

The standard diesel General Motors 8-268A engine was an eight-cylinder, in-line, two-cycle, and air-started engine. It was capable of putting out 300-kilowatt generator output while operating at 1,200 revolutions per minute. The parts that made up this engine were similar to, but somewhat smaller than, the parts that went into the General Motors 16-278A

engine. The two engines differed in design and construction. The 8-268A was an in-line engine, and the 16-278A was not. The 8-268A engine was also used as an auxiliary engine on-board fleet submarines. The 8-268A engine powered 195 SCs during World War II.

The General Motors 184A "Pancake" diesel engine was developed by the General Motors' 1942 Research and Development Program and was built by their Electro-Motive Division at General Motors' LaGrange, Illinois, facility. The 184A engine was a supercharged, two-cycle diesel engine that had a vertical crankshaft and four banks of four cylinders each. These engines drove electrically controlled, variable-pitch propellers. This 16-cylinder engine was built into 243 SCs used during the World War II.

## Construction

The Navy's urgent need for subchasers to counter German U-Boats, and the relative shortage of 16-278A "Pancake" engines meant that not all SC-497 Class boats could be fitted out with these better engines and variable-pitch propellers.

The Westergard Boat Works in Rockport, Texas, built the SC-497 and seven more such vessels during World War II. Although the SC-497 was the lead-ship of a new class of vessel, she was not the first of that type to be completed. The first SC-497 Class boat to be completed was the SC-507, which was finished on 19 January 1942, about three months before SC-497. The revised hull had yellow pine or Douglas fir longitudinal planking laid over 109 frames, which made a very sturdy hull. The hull had a layer of 3/4-inch white oak sheathing that ran parallel to the waterline as well as a foot above and below the waterline. The boat had an external keel and an extended keel skeg, which provided protection for the lower hull. Seven watertight bulkheads divided the interior of the hull into compartments, which contained the following rooms:

- Forepeak
- Forward Crew's Quarters
- Magazine
- Officers' Quarters and Radio and Sonar Room
- Engineroom
- Fuel and Fresh Water Tanks
- After Crew's Quarters and Galley
- Lazarette

Provisions were also made for additional fuel and fresh water tanks, located under the forward crew's quarters and the officers' quarters. The upperworks of the SC-497 Class consisted of a pilot house and two trunk cabins. The two trunk cabins were one foot in height above the deck, and they were built to allow for additional head room below-decks since the vessel's hull was so shallow. The forward-most trunk cabin covered the area of the hull from frame 37 to frame 71, which was from the aft bulkhead of the magazine to the aft bulkhead of the engine room. A companionway, located on this trunk cabin, provided access to the engine room.



The after-most trunk cabin, which was smaller than the forward one, only covered part of the galley and part of the crew's head. Early units of this class featured a single 20mm Oerlikon on a Mark IV mount, a companionway, a vegetable locker, several vents, and a wherry (a rowboat) positioned on this cabin. On later units, a bandstand was built over this cabin to provide space for a third 20mm gun.

Skilled craftsmen, able to turn out seaworthy vessels, worked at some of the small yards that built the SC-497 Class boats and some of the earlier SC-1 Class boats. The hull planking was caulked with oakum and cotton, painted, and then filled with putty.

Construction time for an SC-497 Class vessel was normally six months, from keel laying to launch. The Elizabeth City Shipyard in North Carolina, however, built the SC-704 in 30 days. The crew of an SC-497 Class boat in World War II was 27 – three officers and 24 enlisted men.

The SC-497 Class' pilot house, roof, and deck, were made from  $\frac{3}{4}$ -inch, five-ply Douglas fir covered with eight-ounce cotton duck. Its sides were  $\frac{3}{4}$ -inch, five-ply Douglas fir covered with eight-ounce cotton duck or mahogany veneer. Decking was  $1\frac{3}{4}$ -inch by  $2\frac{3}{4}$ -inch Douglas fir planking. Three-inch by 6-inch yellow pine, covered by  $1\frac{1}{8}$ -inch by 3-inch white oak boards, made up the upper guardrail; and 3-inch by 6-inch yellow pine, covered by  $1\frac{1}{8}$ -inch by 3-inch white oak, made up the lower guardrail. The hull sheathing was  $\frac{3}{4}$ -inch by 4-inch white oak with  $\frac{1}{8}$ -inch spacing, and the garboard strake was  $2\frac{1}{4}$ -inch by 11-inch yellow pine. The vessel's keel was made from 7-inch by 12-inch white oak. Hull planking was yellow pine or Douglas fir.

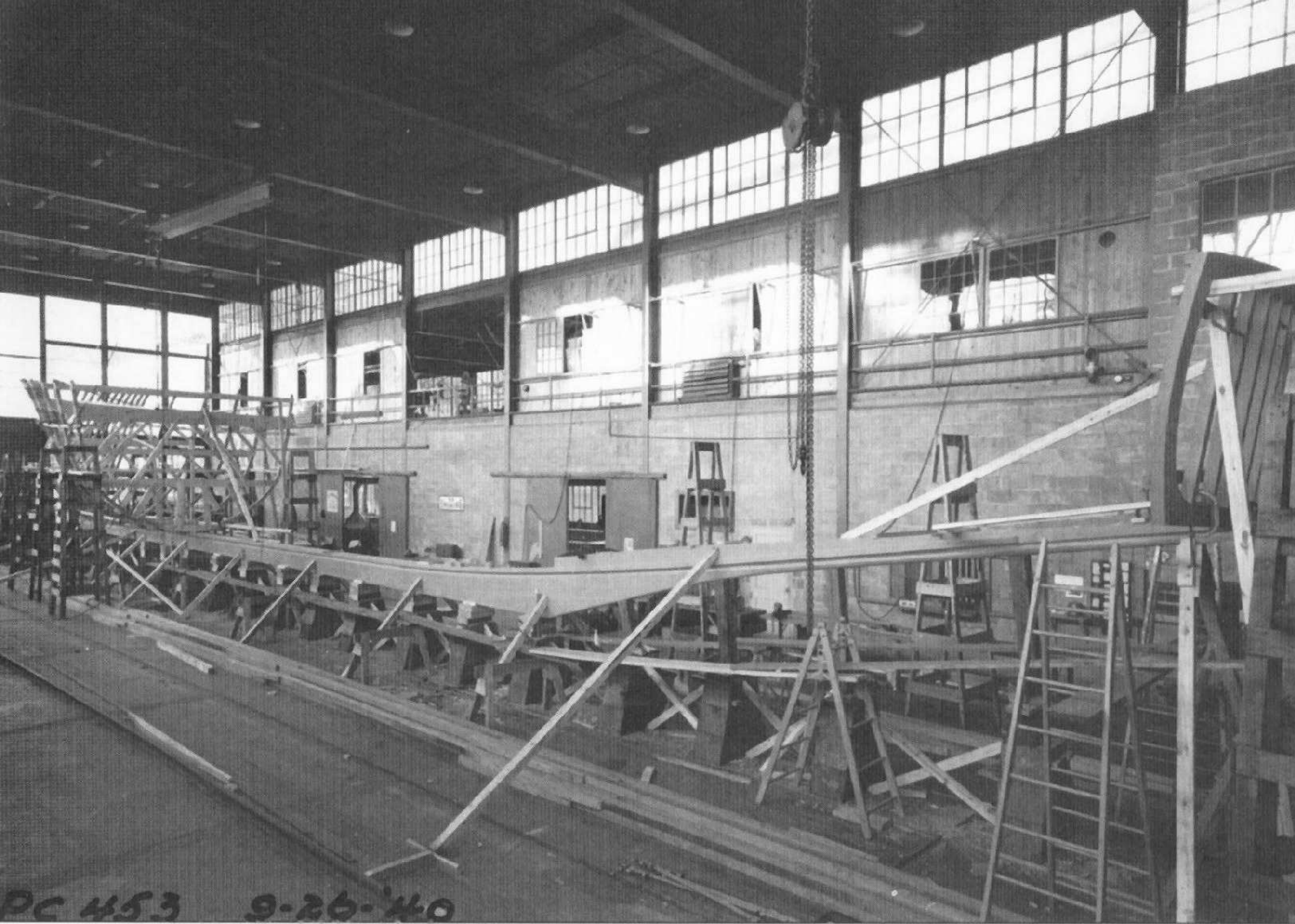
(Continued on Page 17)

**PC/SC-453 was one of the pre-WWII experimental SC hulls, although she was nothing but an upgraded SC-1 Class boat. (NARA)**

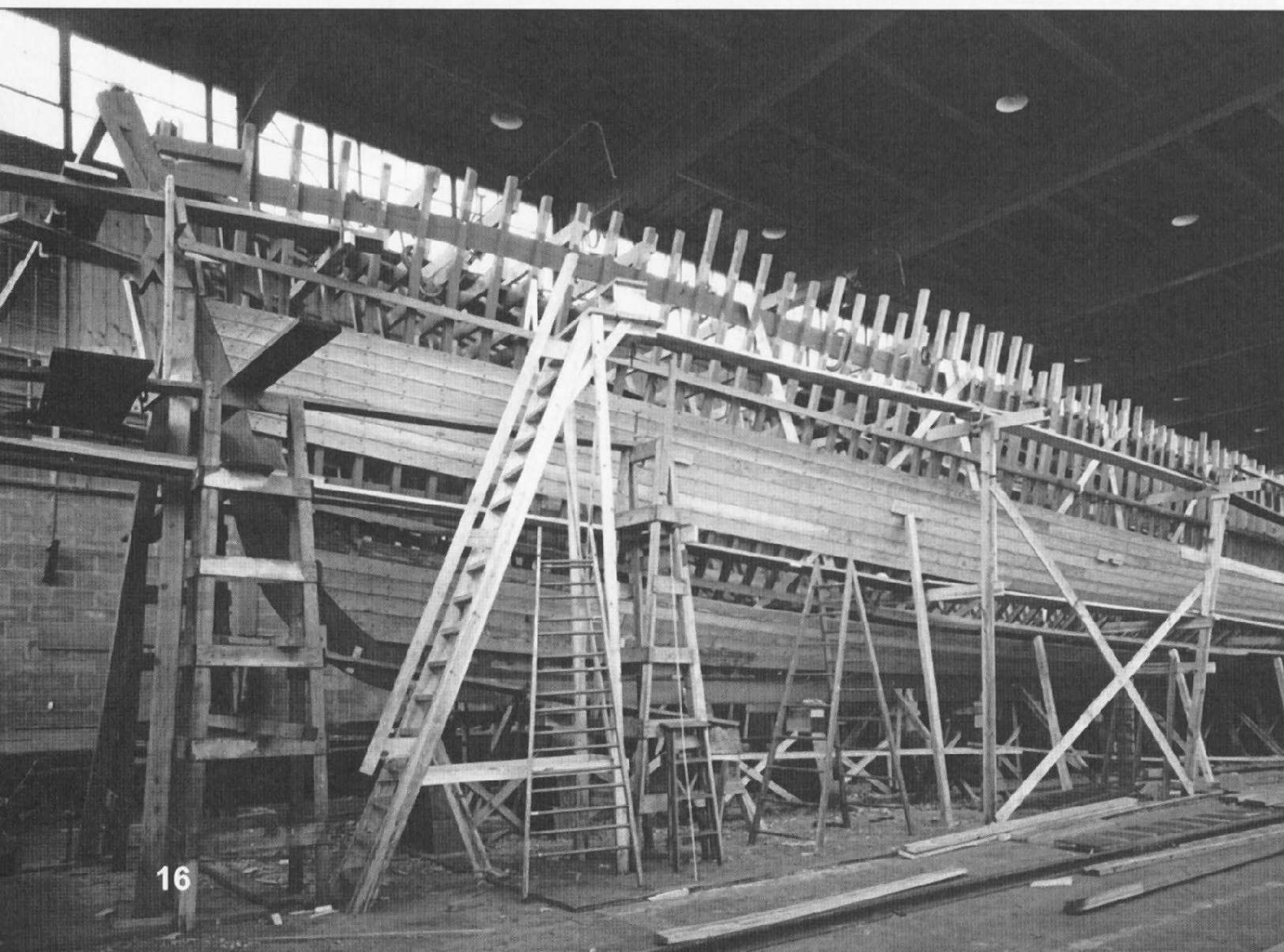


The similarities to the First World War's incarnation of the type can be seen in this photo. (NARA)





These photographs from 1938 illustrate the construction process of the PC/SC-453 at the Fisher Boat Works in Detroit, Michigan. (NARA)

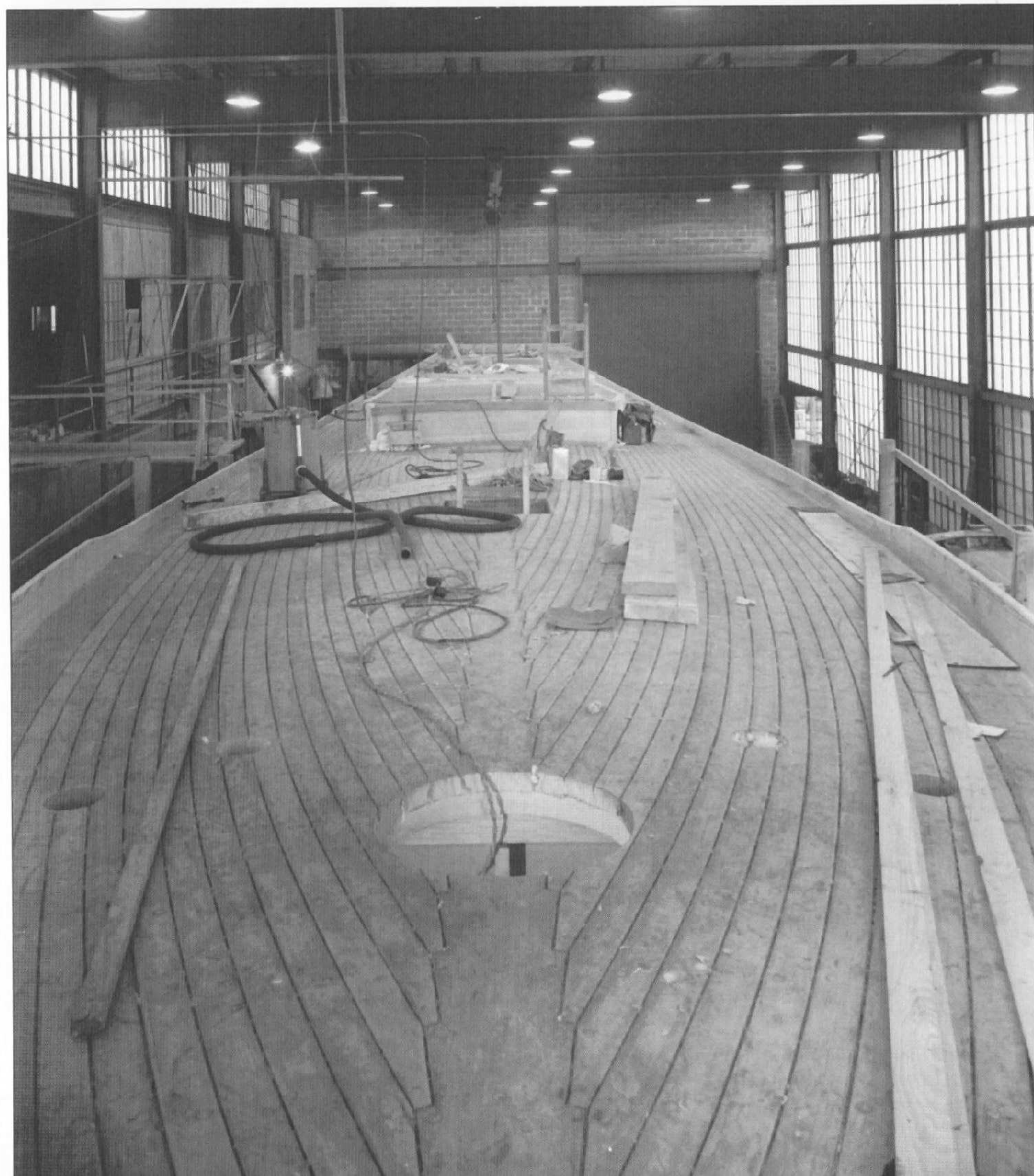




The SC-497 Class boats were originally designed to carry one of the 3-inch/23-caliber, Mark XIV guns on the foredeck with two of the 3-inch/50-caliber, Mark XXII guns on a platform that was located aft of the pilothouse. After the Navy found that the 3-inch/23-caliber gun was not at all satisfactory, a 3-inch/50-caliber gun was put in its place. This modification called for a platform to be constructed that was almost as high as the trunk cabin and was located behind the spray shield on the foredeck. When the two 3-inch/50-caliber guns were deleted from the design, two water-cooled .50-caliber machine guns on pedestal mounts and later, 20mm Oerlikon guns on Mark IV mounts replaced them.

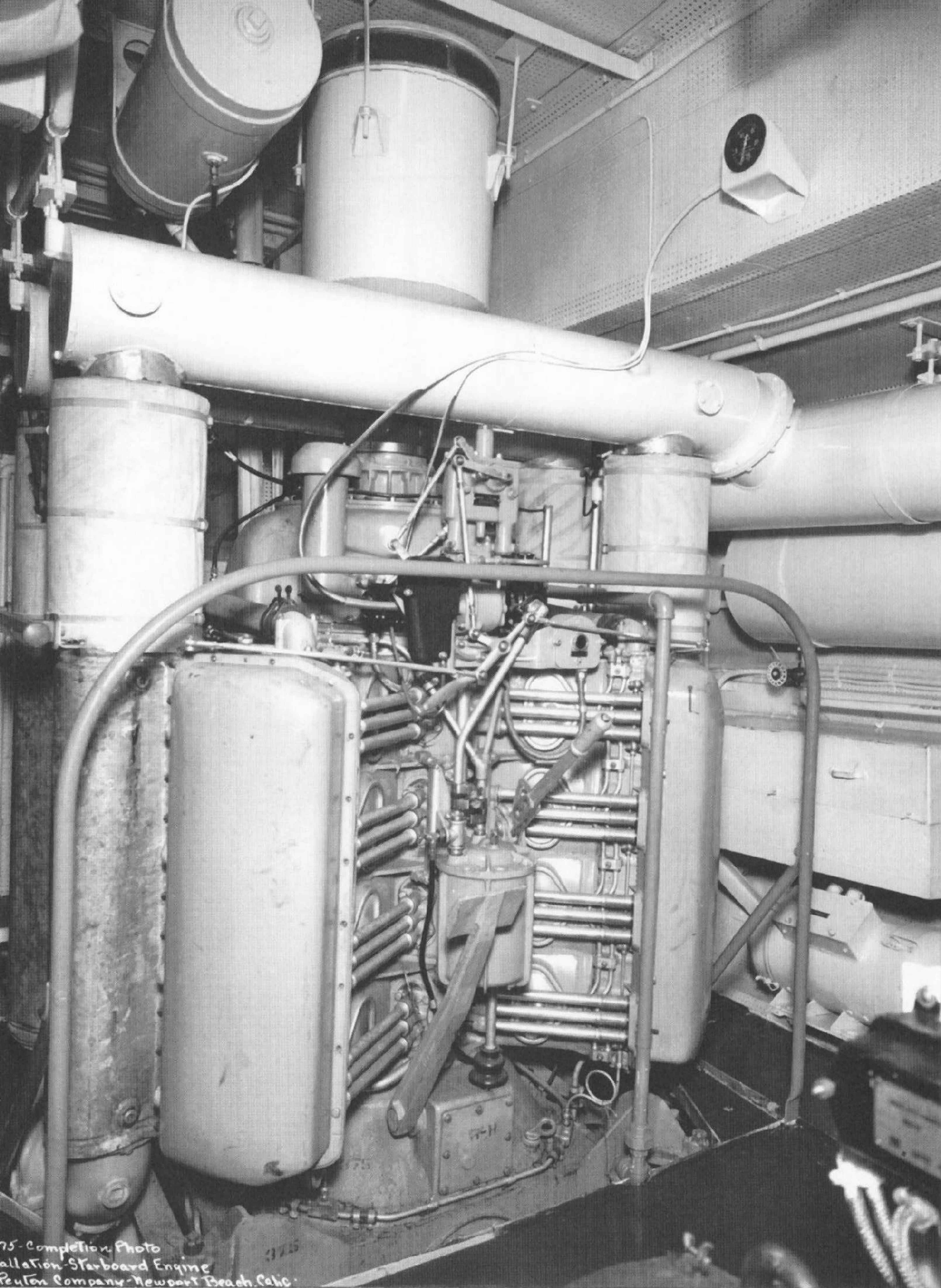
Photographic evidence indicates that the SC-1 Class SC-431 was used as a test-bed for an experiment that mounted an aircraft engine on the aft section of the boat.

**The deck planking of the PC/SC-453 is seen here at the Fisher Boat Works. (NARA)**



**The PC/SC-453 was fitted out once it was in the water. (NARA)**





75-Completion Photo  
Installation-Starboard Engine  
Peyton Company-Newport Beach, Calif.

The starboard engine on board SC-775 was photographed following the construction of the vessel by the Peyton Company in Newport Beach, California. (NARA)

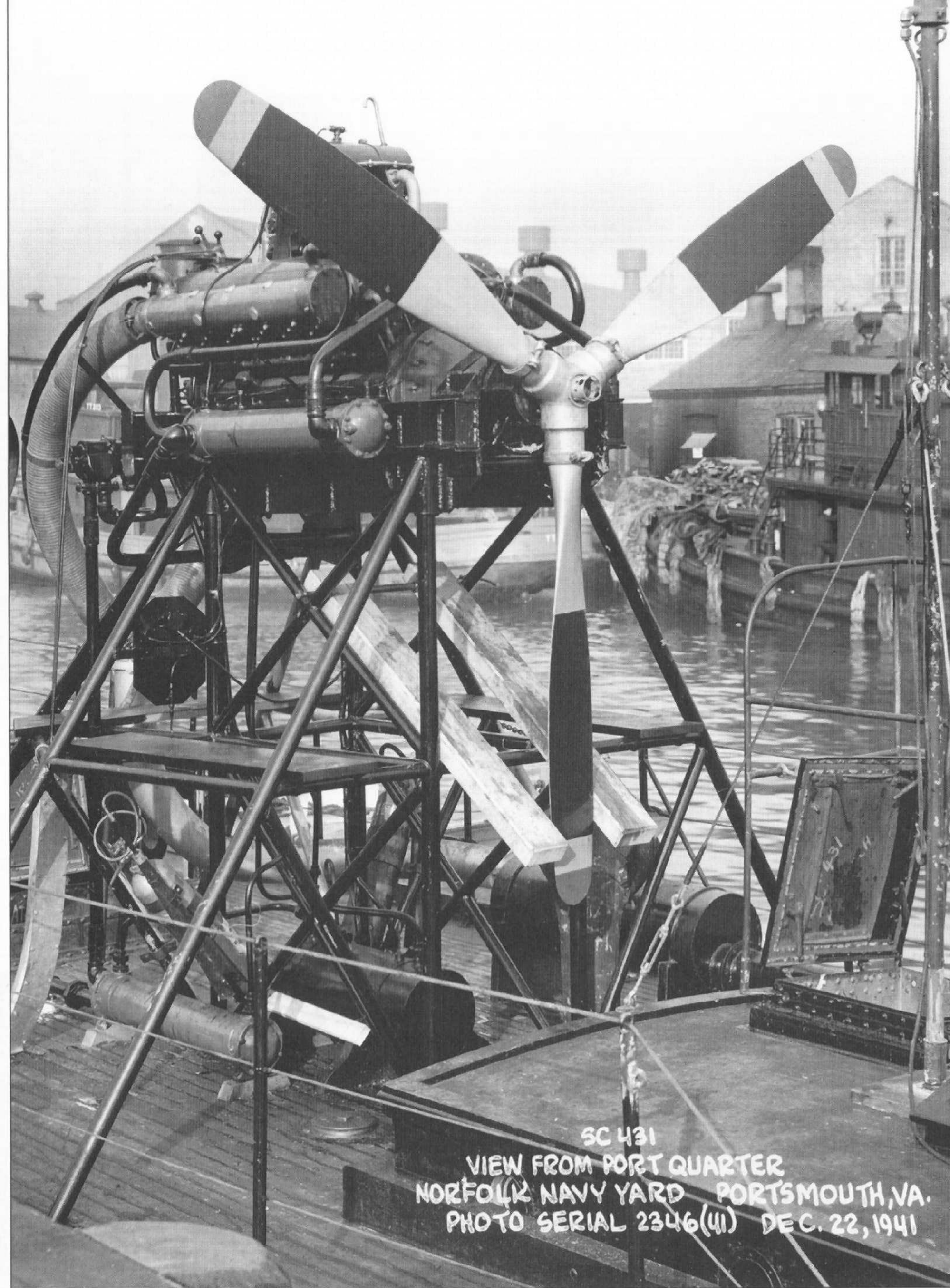


The SC-431, a WWI SC-1 Class boat, was being used as a test-bed for an alternative propulsion system when she was photographed in December 1941. (NARA)





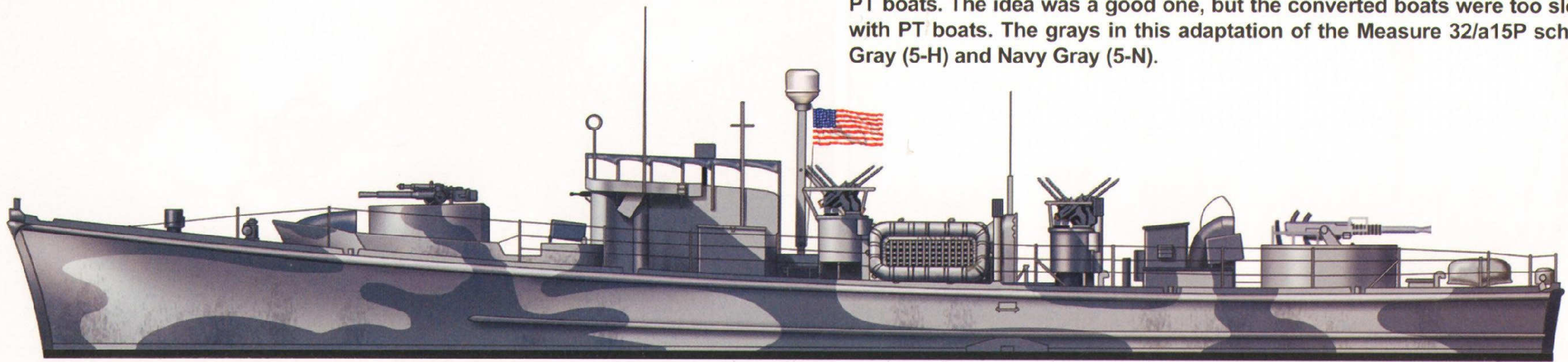
An aircraft engine and propeller have been installed on the stern of SC-431 to test the ability of submerged submarines to detect engine noise. The test was not a success. (NARA)



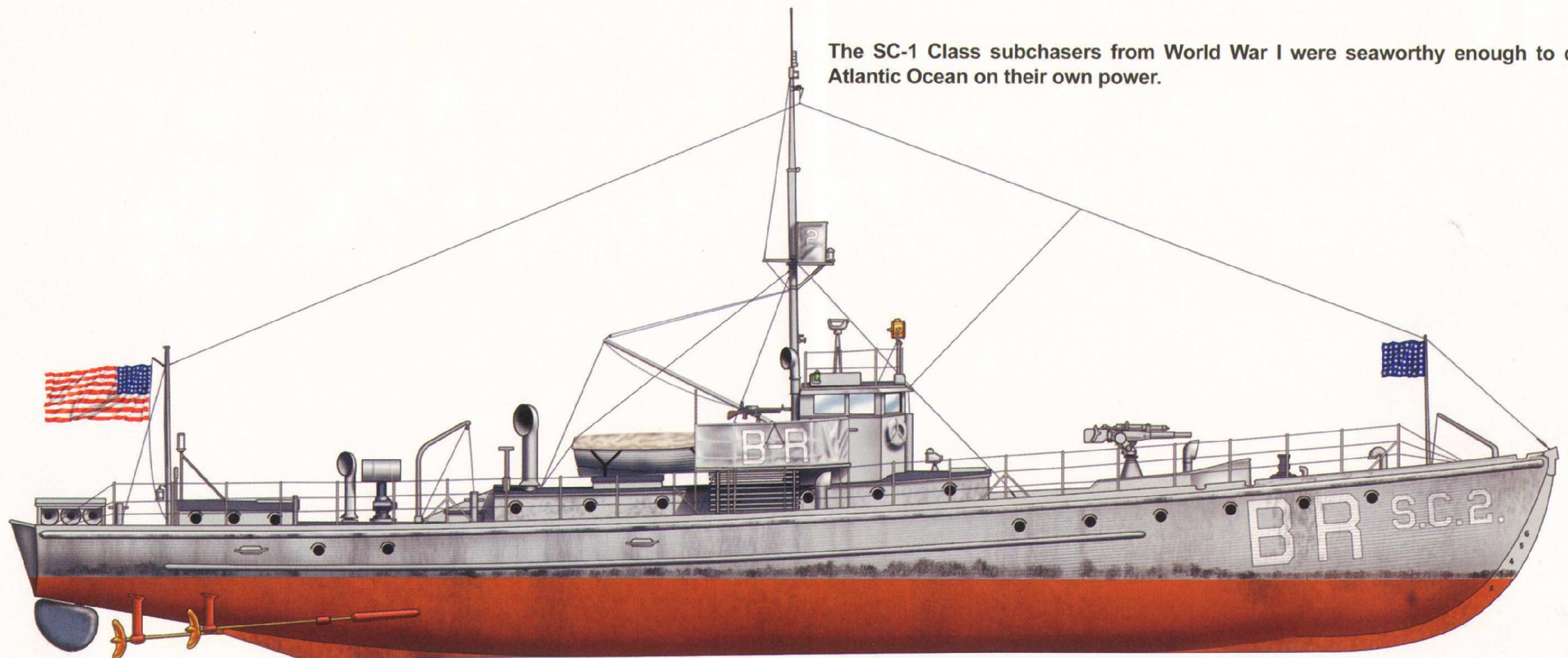
The Liberty aircraft engine underwent tests for noise level aboard the SC-431 in Portsmouth, Virginia, in December 1941. (NARA)



Eight 110-foot subchaser hulls were converted to PGM-1 Class vessels to operate with PT boats. The idea was a good one, but the converted boats were too slow to keep up with PT boats. The grays in this adaptation of the Measure 32/a15P scheme are Haze Gray (5-H) and Navy Gray (5-N).

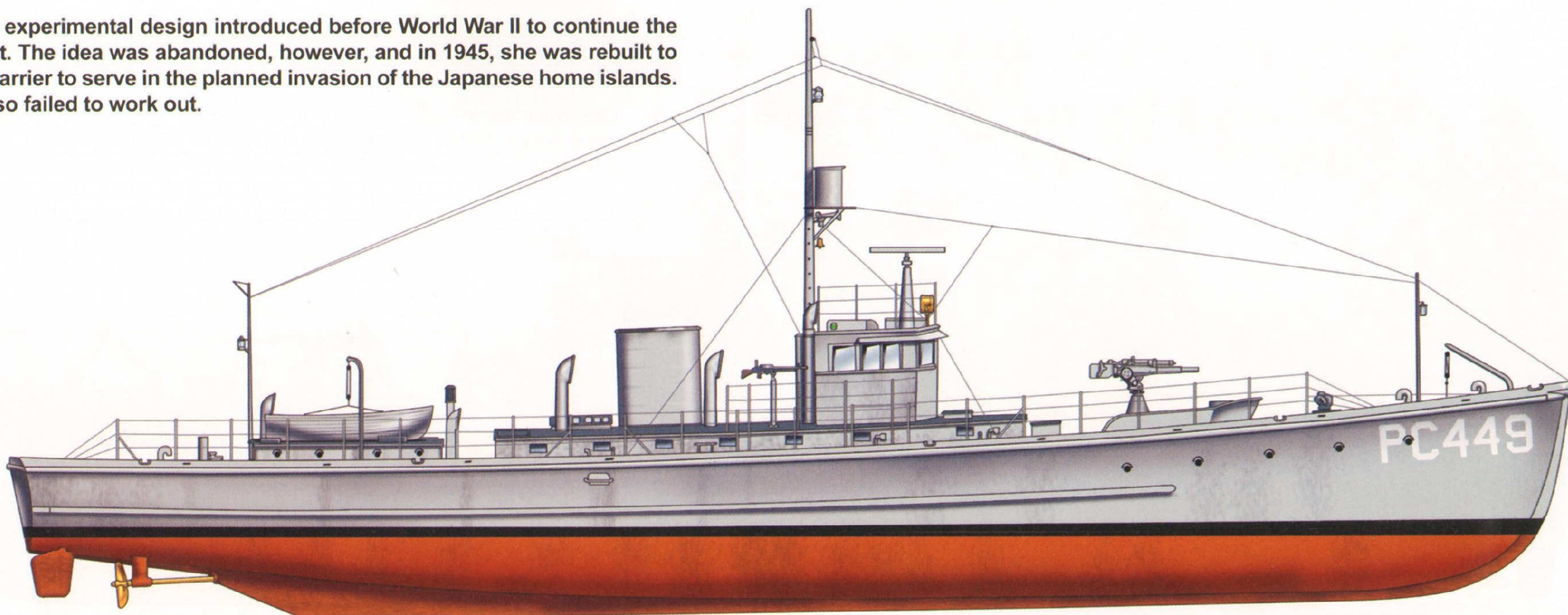


The SC-1 Class subchasers from World War I were seaworthy enough to cross the Atlantic Ocean on their own power.

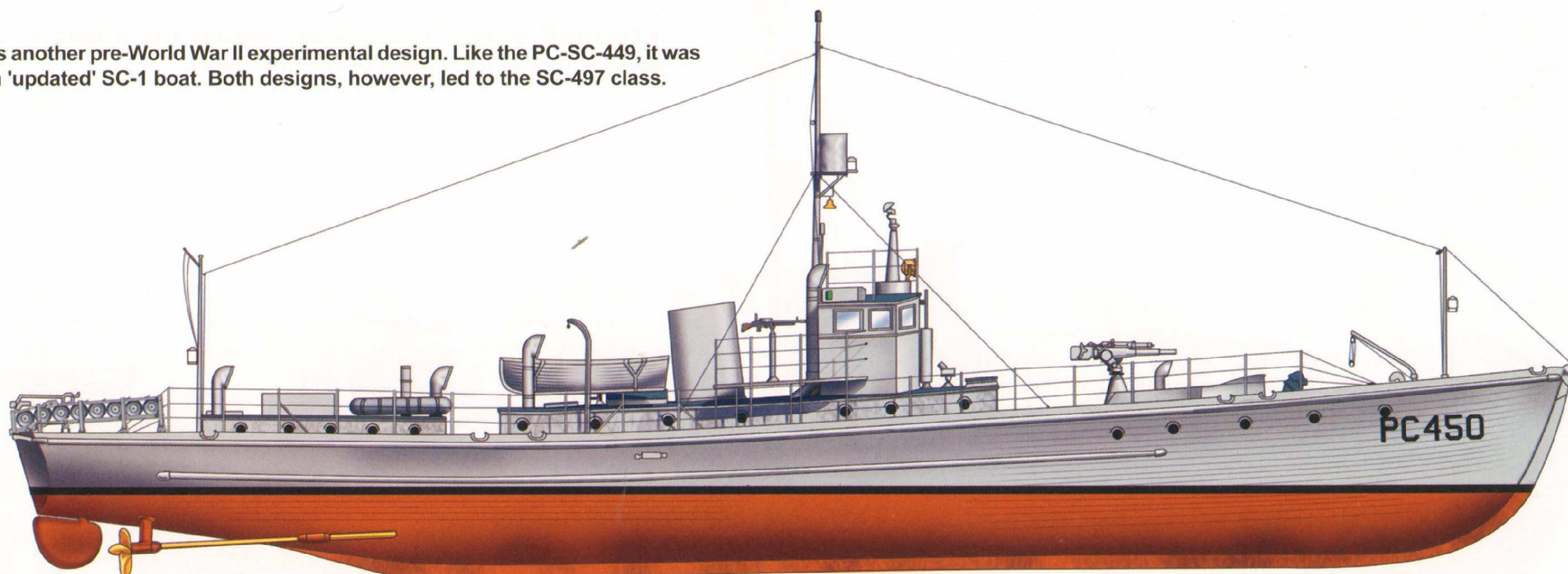




PC/SC-449 was an experimental design introduced before World War II to continue the subchaser concept. The idea was abandoned, however, and in 1945, she was rebuilt to look like an escort carrier to serve in the planned invasion of the Japanese home islands. That adaptation also failed to work out.

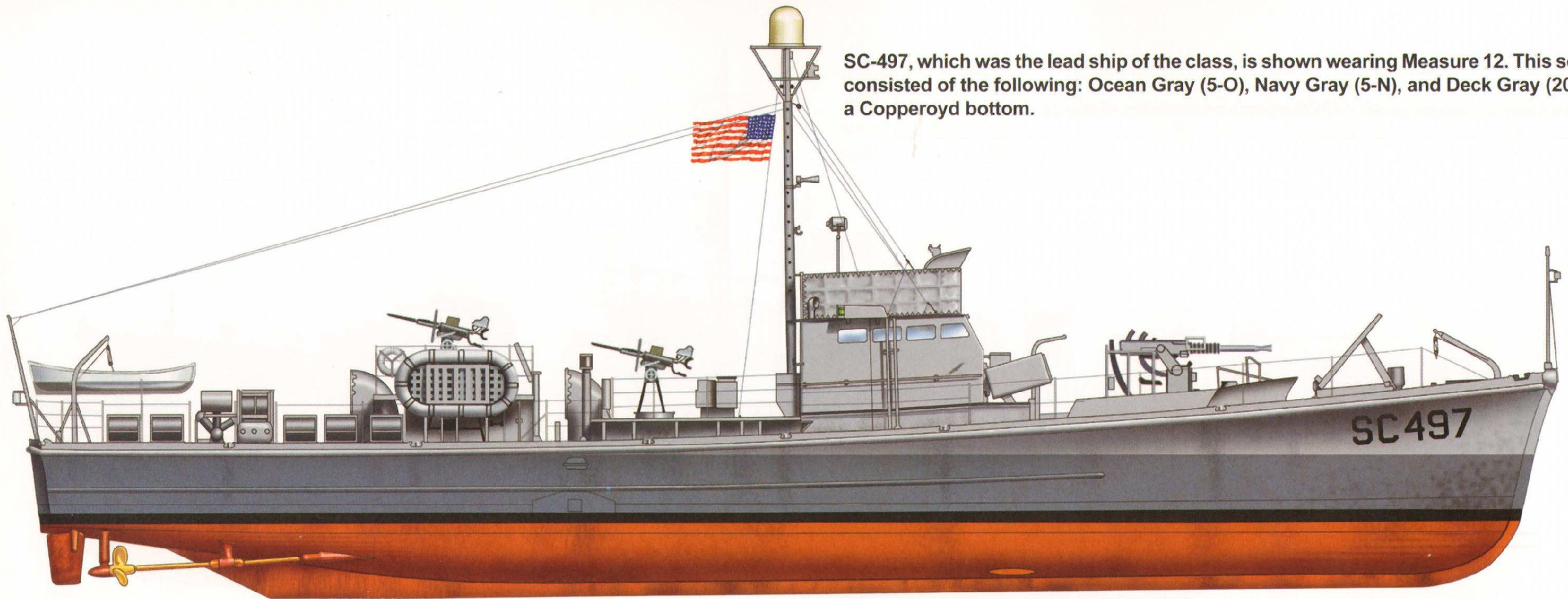


PC/SC-450 was another pre-World War II experimental design. Like the PC-SC-449, it was nothing but an 'updated' SC-1 boat. Both designs, however, led to the SC-497 class.

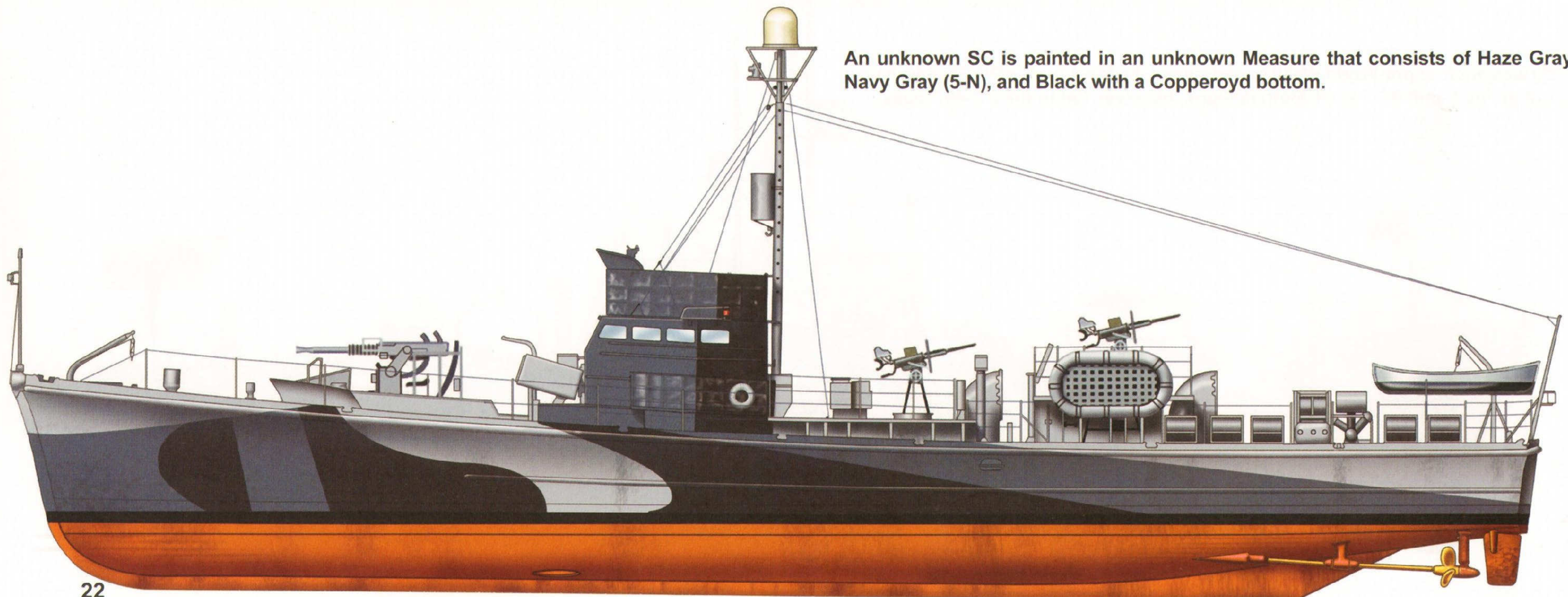




SC-497, which was the lead ship of the class, is shown wearing Measure 12. This scheme consisted of the following: Ocean Gray (5-O), Navy Gray (5-N), and Deck Gray (20), with a Copperoyd bottom.



An unknown SC is painted in an unknown Measure that consists of Haze Gray (5-H), Navy Gray (5-N), and Black with a Copperoyd bottom.





## WWII Armament

The depth charges used by the USN in World War II had an effective percussive wave radius that depended on the structural strength of the vessel under attack. A 600-pound depth charge would cause moderate damage at a range of 80 feet and would prove fatal at a range of 30 feet. The 300-pound depth charge in service could have a kill radius of 20 feet.

The SC-497 Class used the Mark VI depth charge. The sixth version of the depth charge weighed 420 pounds and had a 300-pound explosive charge. Its sink rate was eight feet per second and could be set to detonate at any depth between 30 and 300 feet.

The SC-497 Class boats in World War II had various guns mounted on the foredeck. These guns were the 3-inch/23-caliber, Mark XIV gun; the 3-inch/50-caliber, Mark XXII gun; and the Bofors 40mm, Mark III gun. The 3-inch/23-caliber, Mark XIV gun was a single mount, dual-purpose gun that weighed 1,510 pounds and had a muzzle velocity of 1,650 feet per second. The Mark XIV gun could be elevated to a maximum angle of +65 degrees and depressed to -15 degrees. When fired from its maximum elevation, the gun's shell could reach 16,000 feet. Its range at a 45-degree elevation was 10,100 feet, and the gun could fire anti-aircraft, common, and illuminating shells.

The 3-inch/50-caliber, Mark XXII gun was a single-mount, dual-purpose gun. Its total weight was between 6,700 pounds and 7,510 pounds, and its muzzle velocity was 2,700 feet per second. The Mark XXII gun could be elevated to a maximum angle of +85 degrees and depressed to -15 degrees. When fired from its maximum elevation, the gun could reach 29,800 feet. Its range at a 45-degree elevation was 14,600 yards, and it could fire anti-aircraft, illuminating, and armor-piercing shells.

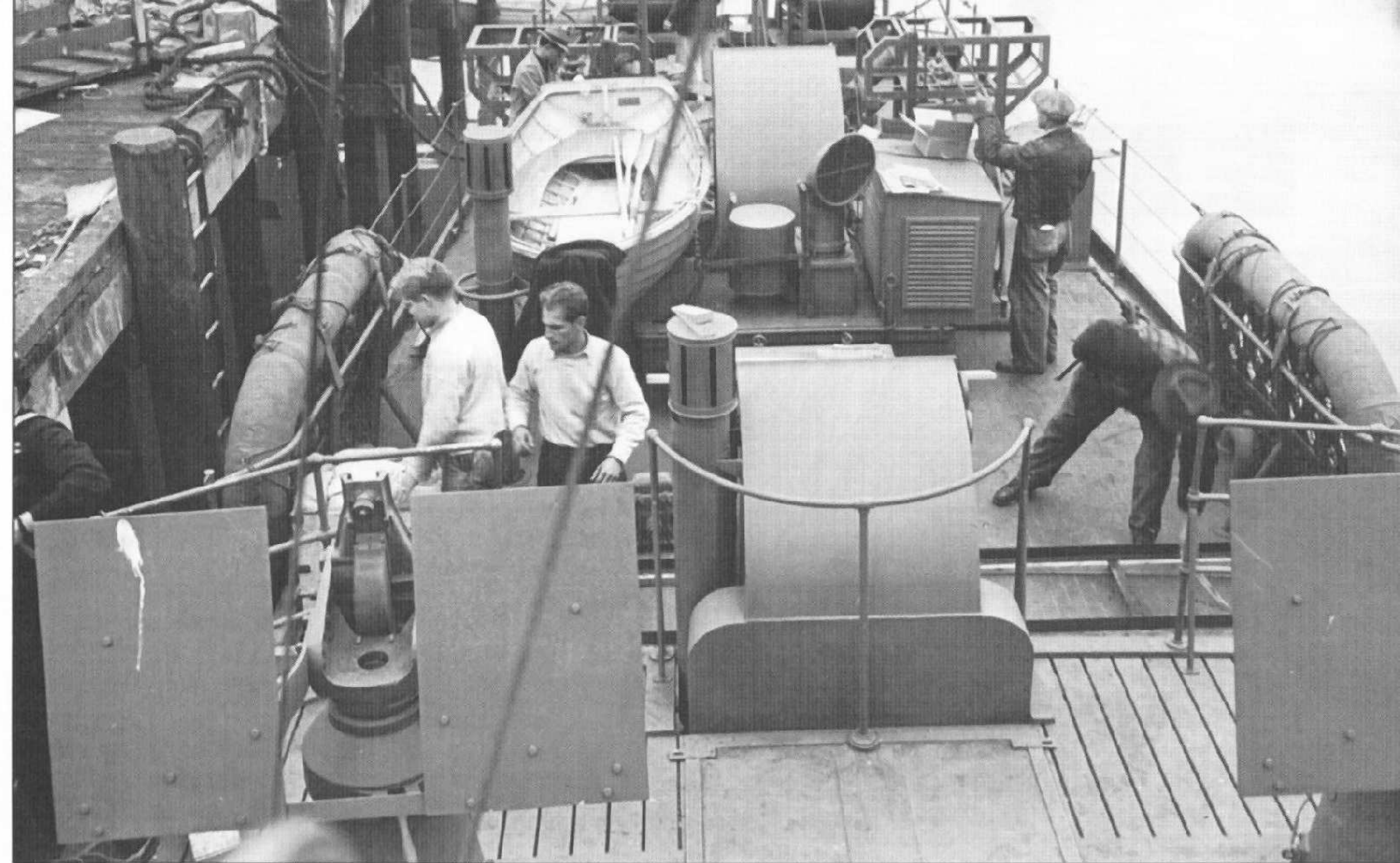
The Bofors 40mm, Mark III gun was a single-mount, manually-operated weapon. It weighed 2,440 pounds and had a muzzle velocity of 2,890 feet per second. The Mark III gun could be elevated to a maximum angle of +90 degrees and depressed to -6 degrees. Its ceiling was 23,500 feet. At an elevation of 42 degrees, its range was 11,000 yards. It could fire high-explosive, armor-piercing, and tracer shells.

Early in the war, the SCs were armed with two single water-cooled .50-caliber machine guns on pedestal mounts located amidships. Those guns were soon replaced by two 20mm Oerlikon guns on Mark IV mounts. Later in the war, these guns were replaced by two 20mm Oerlikon guns on shielded Mark X mounts, with a third mounted on a "band stand" atop the aft trunk cabin.

During World War II, nearly all U.S. Navy vessels large enough for anti-aircraft weapons carried a 20mm Oerlikon gun. Primarily used for anti-aircraft defense, the 20mm Oerlikon was a close-range, high-angle weapon that had a 10,000-foot ceiling and a range of 5,500 yards. Its firing rate was 450 rounds per minute. Its magazine held 60 rounds, and it could fire high-explosive, armor-piercing, and tracer shells.

The 20mm gun could be elevated and depressed on its Mark IV mount. A clamping lever locked the weapon into any desired position. The Mark X was a light-weight, open-ring tripod, with the trunnion bracket and pivot at the top.

Mounted on the foredeck of SCs was an Anti-Submarine Projector, Mark 20, which was commonly dubbed a "Mousetrap" because its launching rails made it resemble a mousetrap. Designed in March 1942, the Mousetrap had an explosive charge that weighed 40 pounds and was part of an 80-pound rocket. The weapon's range was 200 yards. The four to six projectiles that



**A Mark IV pedestal mount with a shield is shown here, but the 20mm gun has yet to be fitted to the mount. (NARA)**

the Mousetrap could fire simultaneously were supposed to have an effective dispersion of 20 feet after they hit the water. This weapon's warhead matched the warhead of another Anti-Submarine Warfare weapon known as a Hedgehog with a rocket motor added.

The 110-foot wooden-hull subchaser of World War II mounted a number of different types of radar, including the SW1C type, which used a single Yagi array; the SF type; and possibly the SF-1 to the SO type and various sub-types of the SO-type radar that were used on PT boats from 1943 onwards. Several U.S. Navy and British Royal Navy vessels in the early part of the war carried the Canadian-built SW-1C type radar.

The SF type radar (and possibly the SF-1) was a surface-search radar set that was intended for vessels like the SCs that were too small to mount the SG radar. This type of radar used a 24-inch dipole-fed parabola antenna that created a beam of 13 degrees by 13 degrees. The antenna rotated at 15 revolutions per minute, and it was situated in a domed radome. The antenna was able to detect a vessel the size of a battleship at a distance of 12 miles and a vessel as big as a destroyer at a distance of eight miles. The antenna could accurately pinpoint a target anywhere from 75 to 200 yards. The whole unit weighed 949 pounds. Before production was halted in October 1944, 1,655 units were manufactured, of which 600 were the SF type.

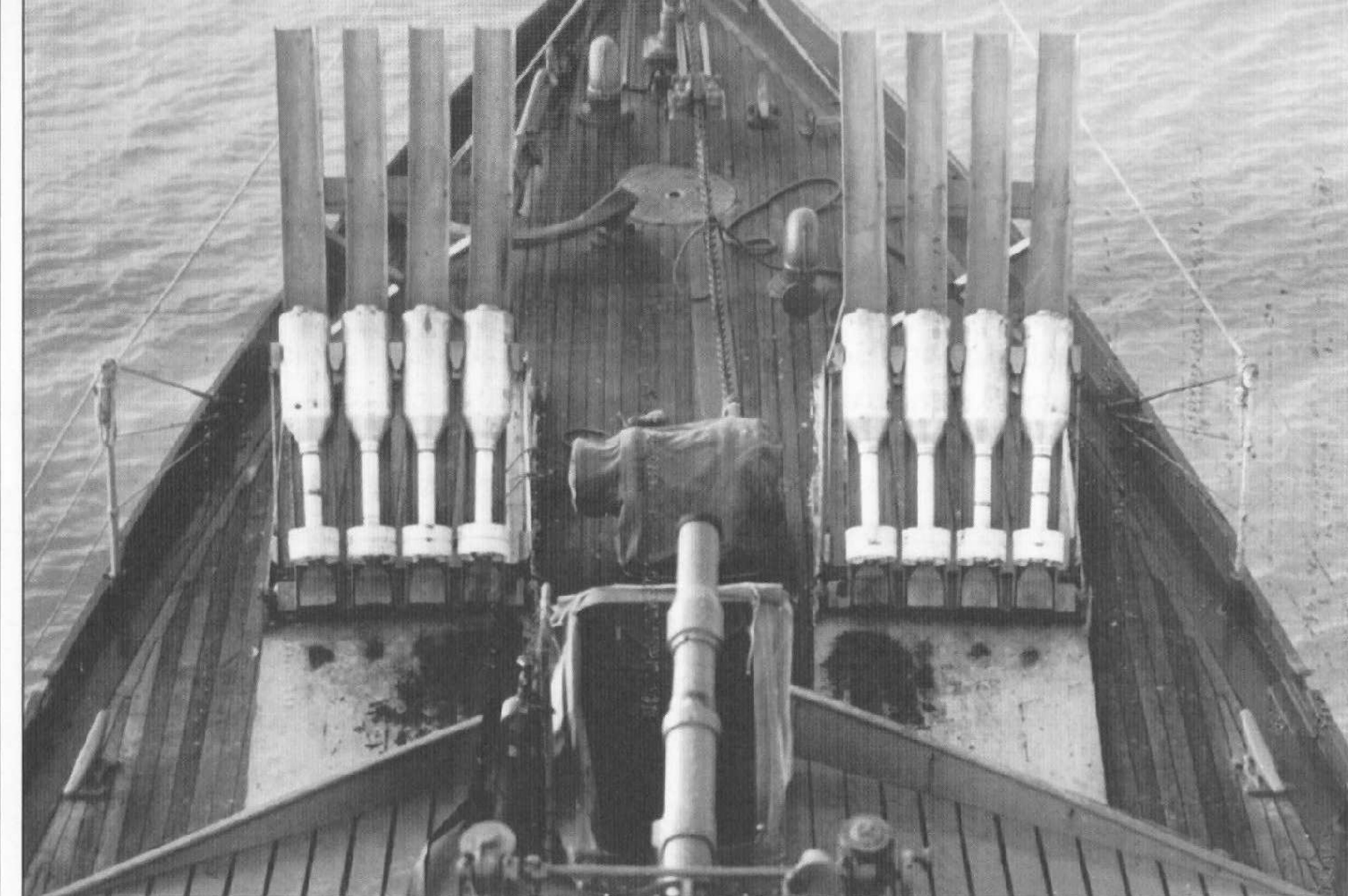
The SC-497 Class boats also used radars of the SO type - the SO, SO-1, and SO-8 sub-variants. Built by Raytheon, this microwave surface-search radar unit was first fitted to a PT boat in the Boston Navy Yard for testing and evaluation in November 1942 and went into full production in February 1943. The original incarnation of the SO type (which was destined for use on PT boats) weighed 420 pounds and used a 24-inch, full paraboloid antenna housed in a domed radome that resembled that of the SF radar unit.

The 110-foot PGMs used the SO-8 subvariant of the SO radar family. Unlike the other subvariants, the SO-8 had a 110-volt power supply rather than a 24-volt supply. Its 30-by-12-inch antenna was housed in a radome.





A 40mm gun is being lowered onto the foredeck of SC/PC-773 in this photograph, taken some time in early or mid-1942, since the vessel still bears the PC designator. (NARA)



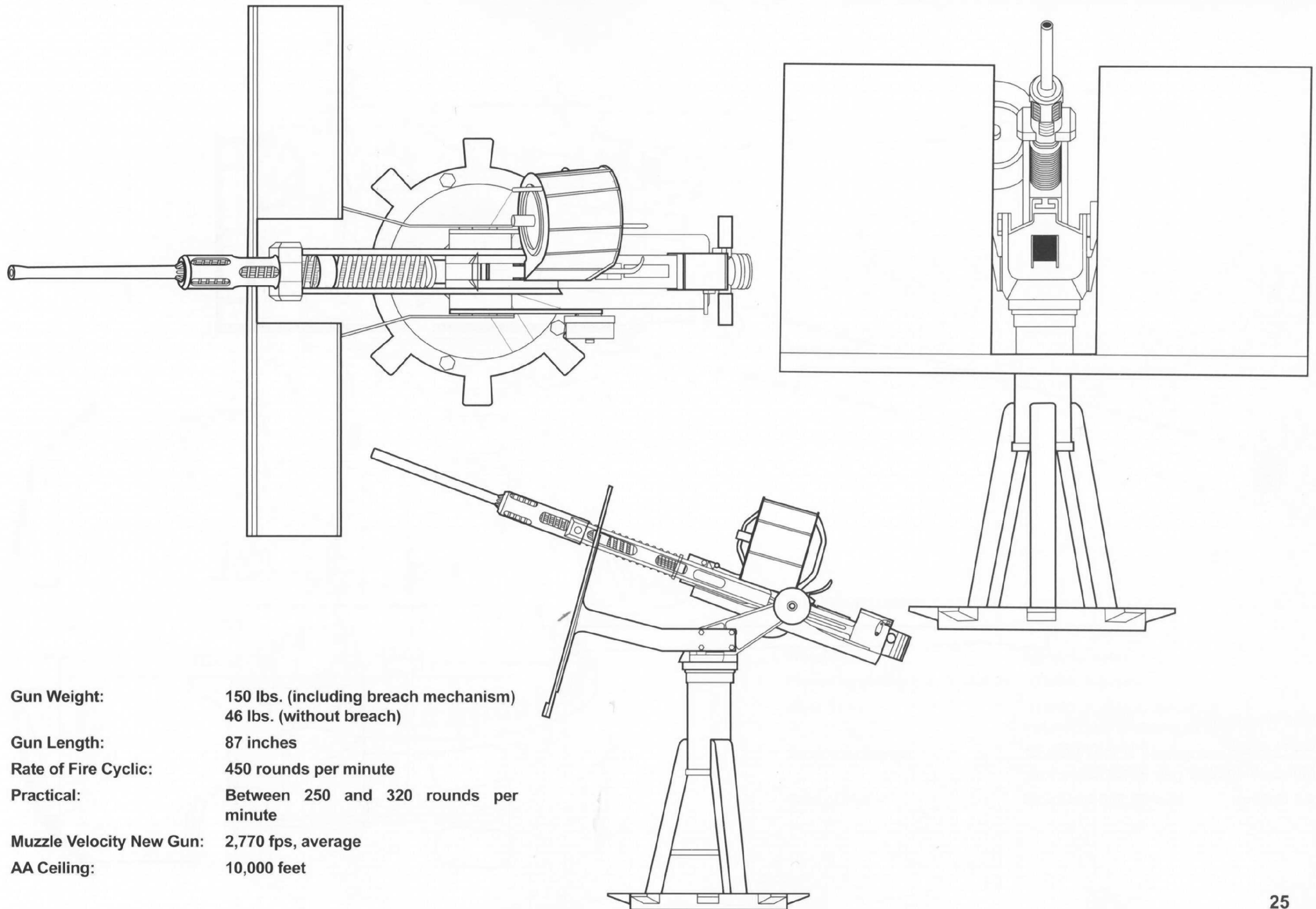
The "Mousetrap" is seen in its typical configuration, mounted on the foredeck of the SC-453. (NARA)

Six depth charges can be seen loaded in the depth charge racks aboard the SC-724 in this photograph, taken in the yard of the Harbor Boat Building on Terminal Island, California, on 20 December 1942. (NARA)





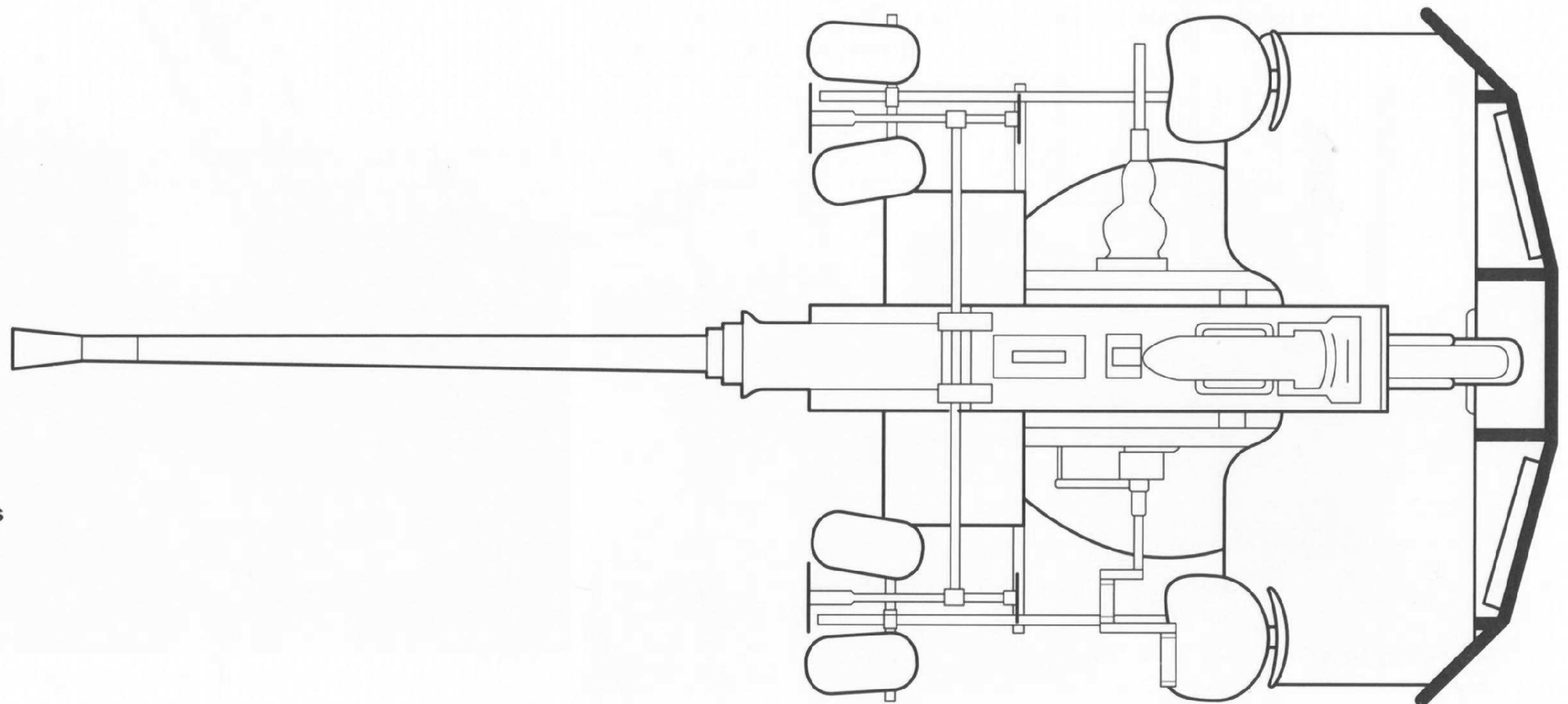
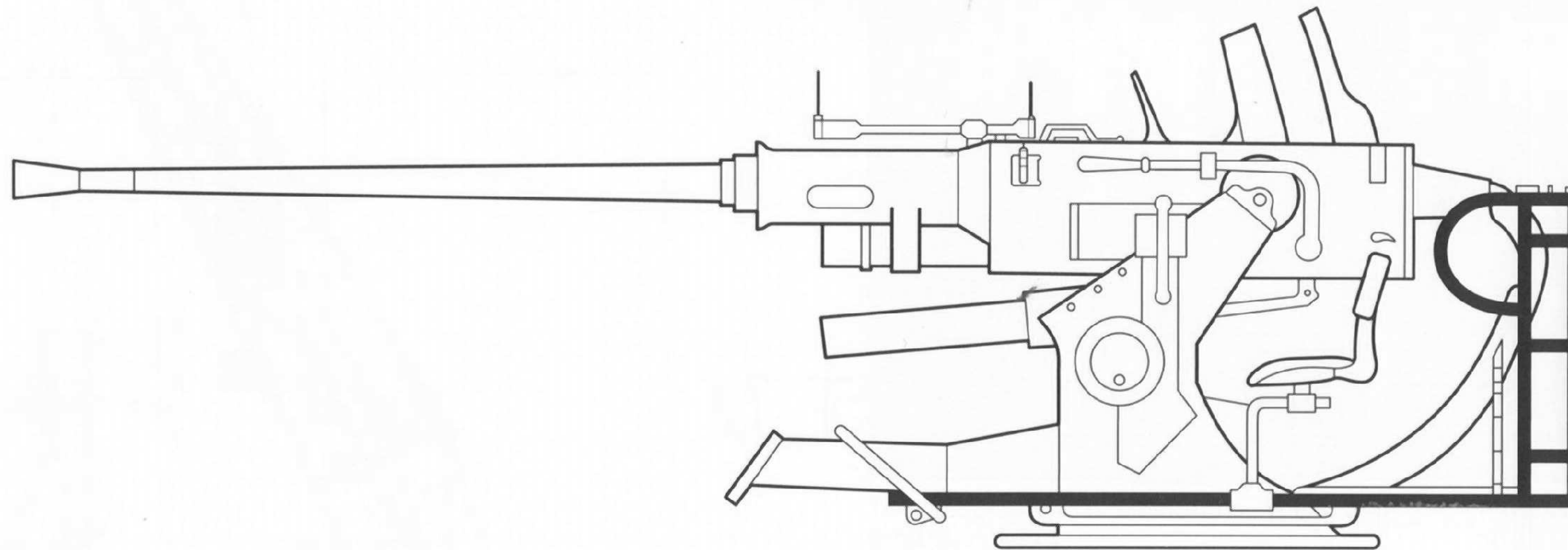
## 20mm Oerlikon (on a Mark X mount)



<b>Gun Weight:</b>	150 lbs. (including breach mechanism) 46 lbs. (without breach)
<b>Gun Length:</b>	87 inches
<b>Rate of Fire Cyclic:</b>	450 rounds per minute
<b>Practical:</b>	Between 250 and 320 rounds per minute
<b>Muzzle Velocity New Gun:</b>	2,770 fps, average
<b>AA Ceiling:</b>	10,000 feet



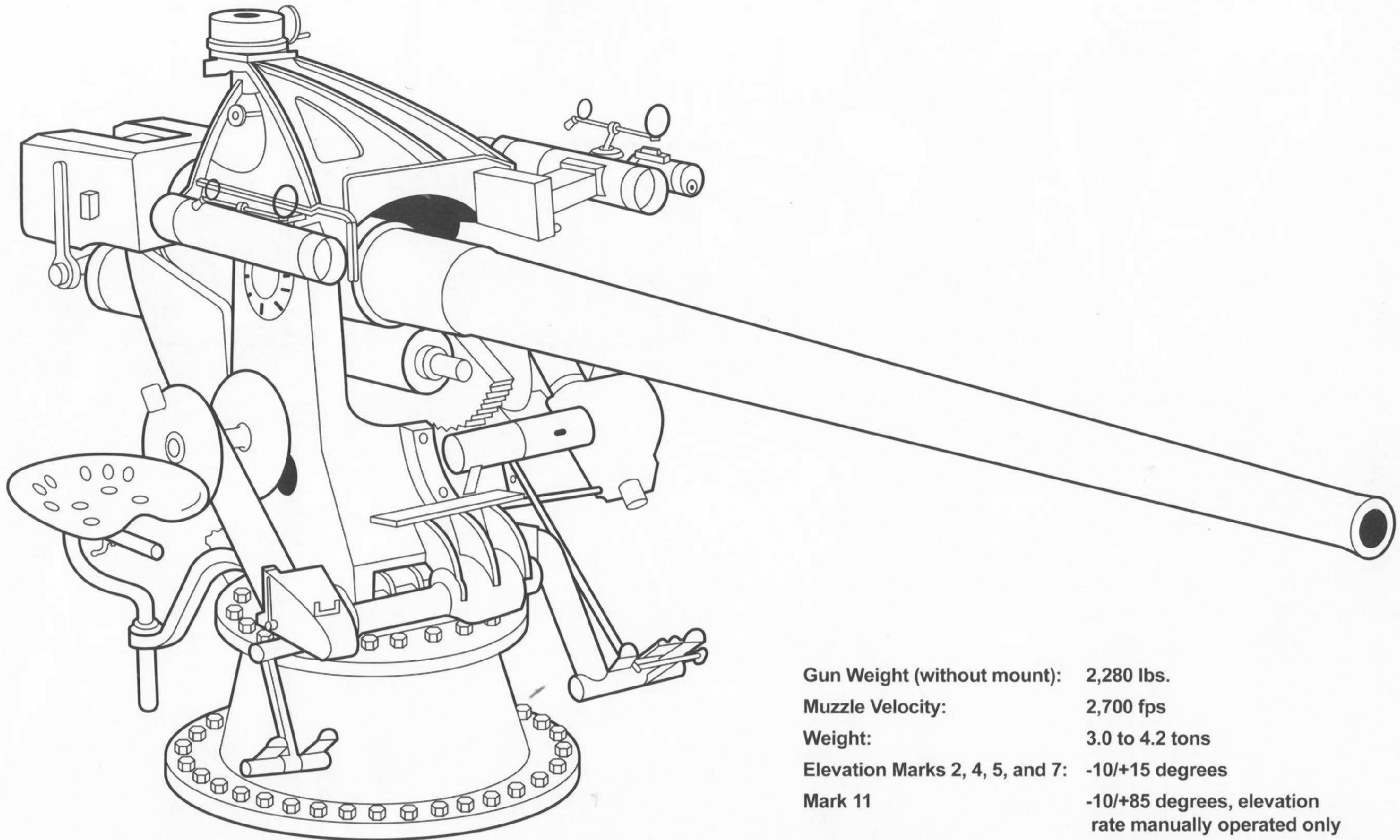
## Bofors 40mm Gun, Mark III



**Gun Weight (net):** 1,036.5 lbs.  
**Gun Length:** 148.8 inches  
**Muzzle Velocity:** 2,890 fps  
**AA Ceiling:** 23,500 feet



## 3-Inch/50-Caliber Gun



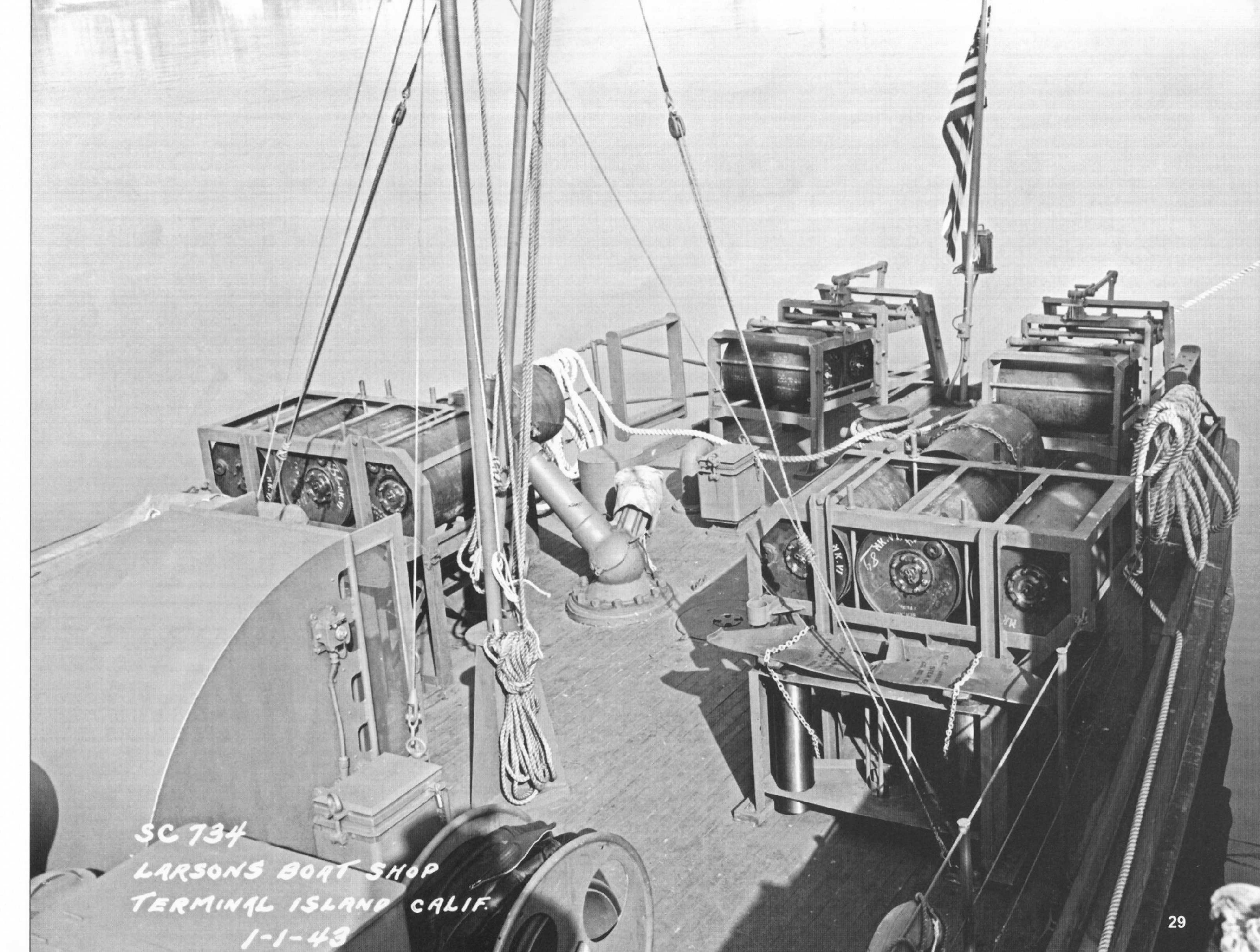
Gun Weight (without mount):	2,280 lbs.
Muzzle Velocity:	2,700 fps
Weight:	3.0 to 4.2 tons
Elevation Marks 2, 4, 5, and 7:	-10/+15 degrees
Mark 11	-10/+85 degrees, elevation rate manually operated only
Maximum Range	14,600 yards at 45 degrees, 29,800 yard ceiling at 85 degrees
Rate of Fire	20 rounds per minute





These two 1943 photographs taken in Terminal Island, California, show the original, as-built arrangement for the depth charge racks on the SC-734. (NARA)





SC 734  
LARSON'S BOAT SHOP  
TERMINAL ISLAND CALIF.  
1-1-43

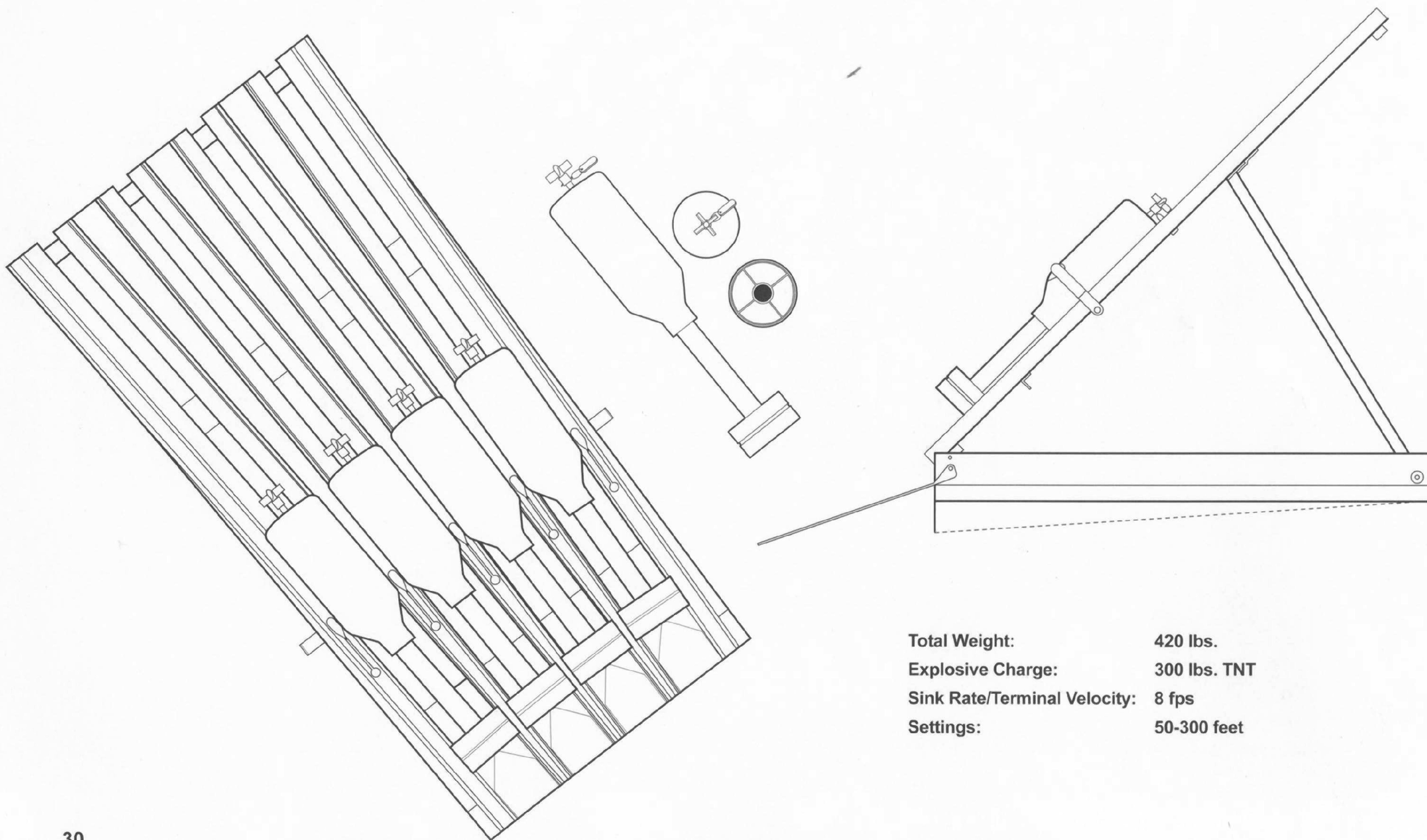


## Mousetrap ASW Rocket

The "Mousetrap" rocket projector with four rails was originally classified as a Rocket Launcher and retained its original Mark number when reclassified as an ASW projector.

This weapon was developed to take the place of the Hedgehog on smaller ships, such as patrol craft, that could not withstand the Hedgehog recoil. An 85-pound warhead was originally fitted, but was too heavy to man-handle in rough seas.

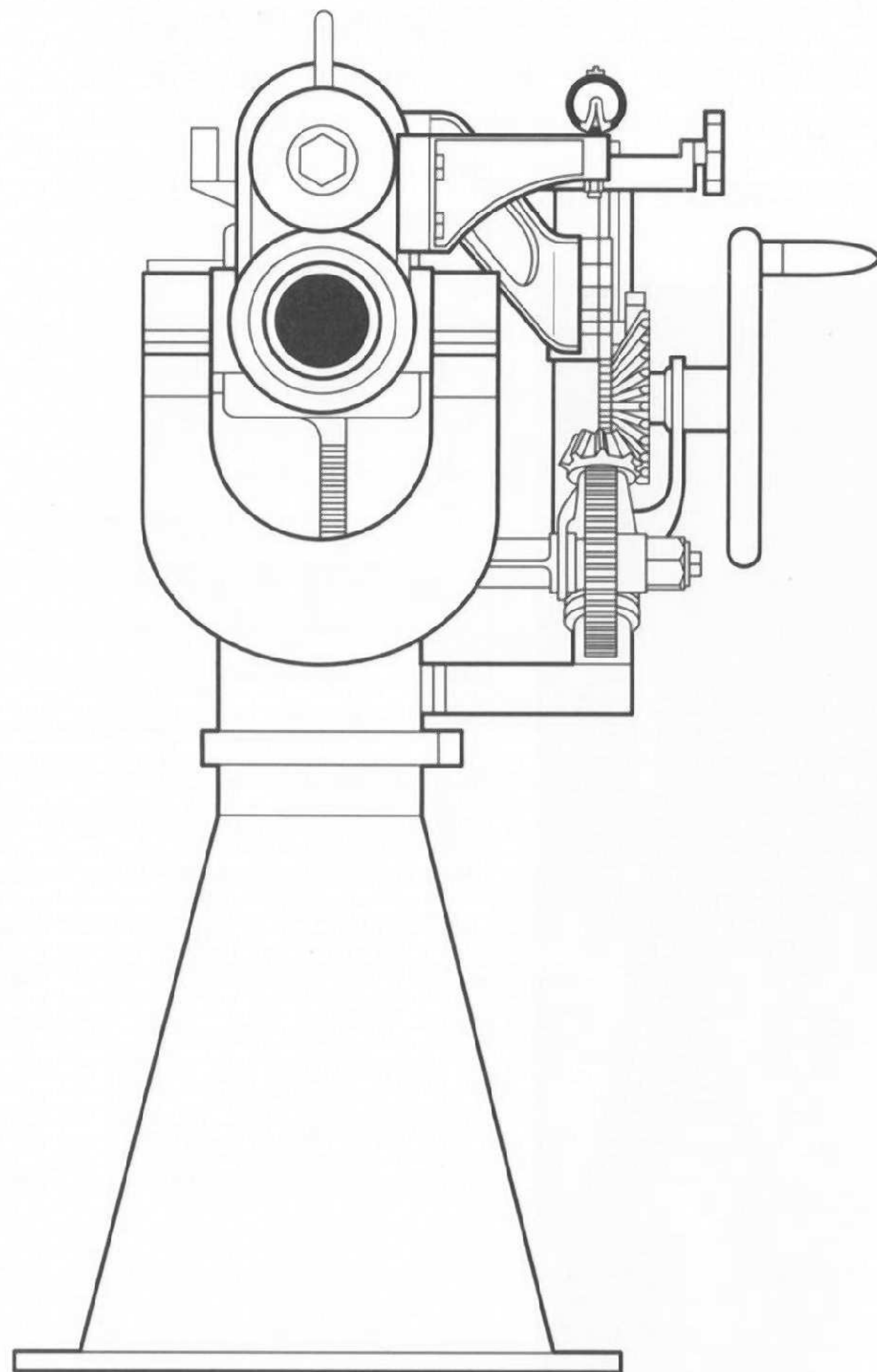
The lighter Hedgehog warhead was then adapted to replace the initial heavier rocket - a modification that had the added benefit of simplifying logistics. The mountings were usually fitted in pairs and could not be compensated for rolling. Not considered as effective as the Hedgehog because of its modified launching system, the "Mousetrap" did give smaller ships an ahead-firing weapon.



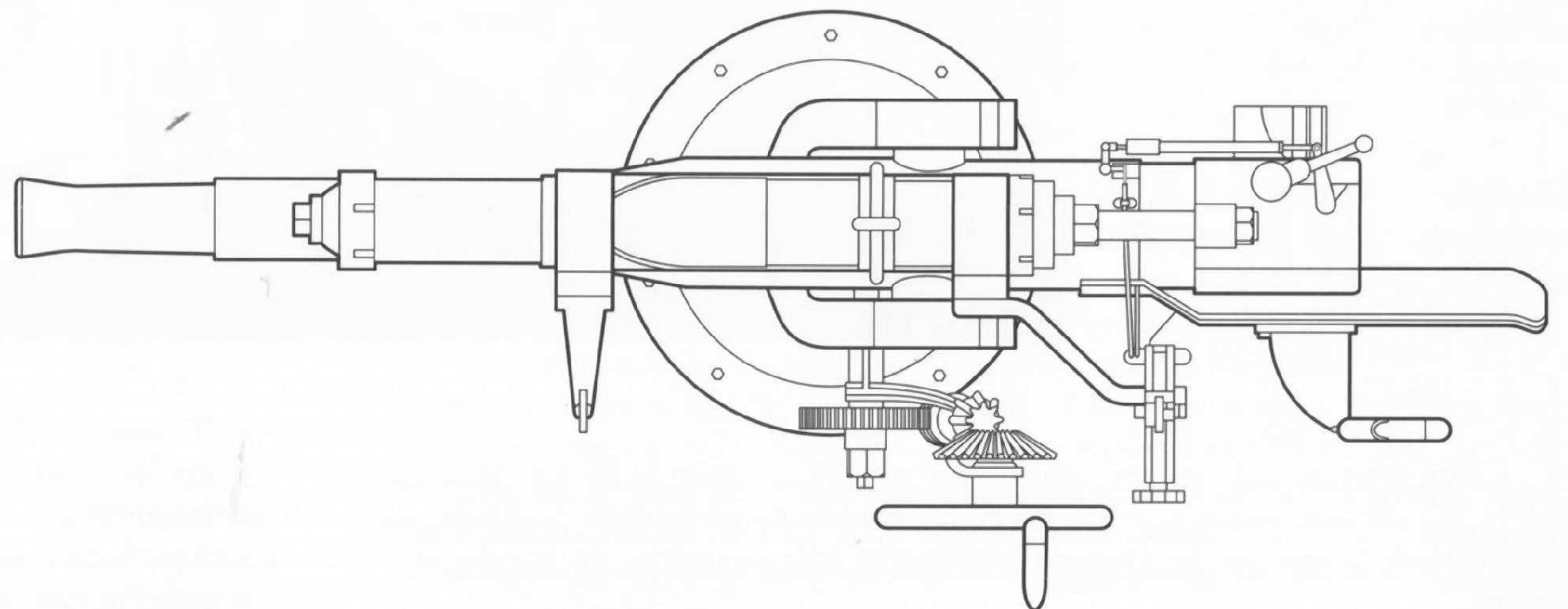
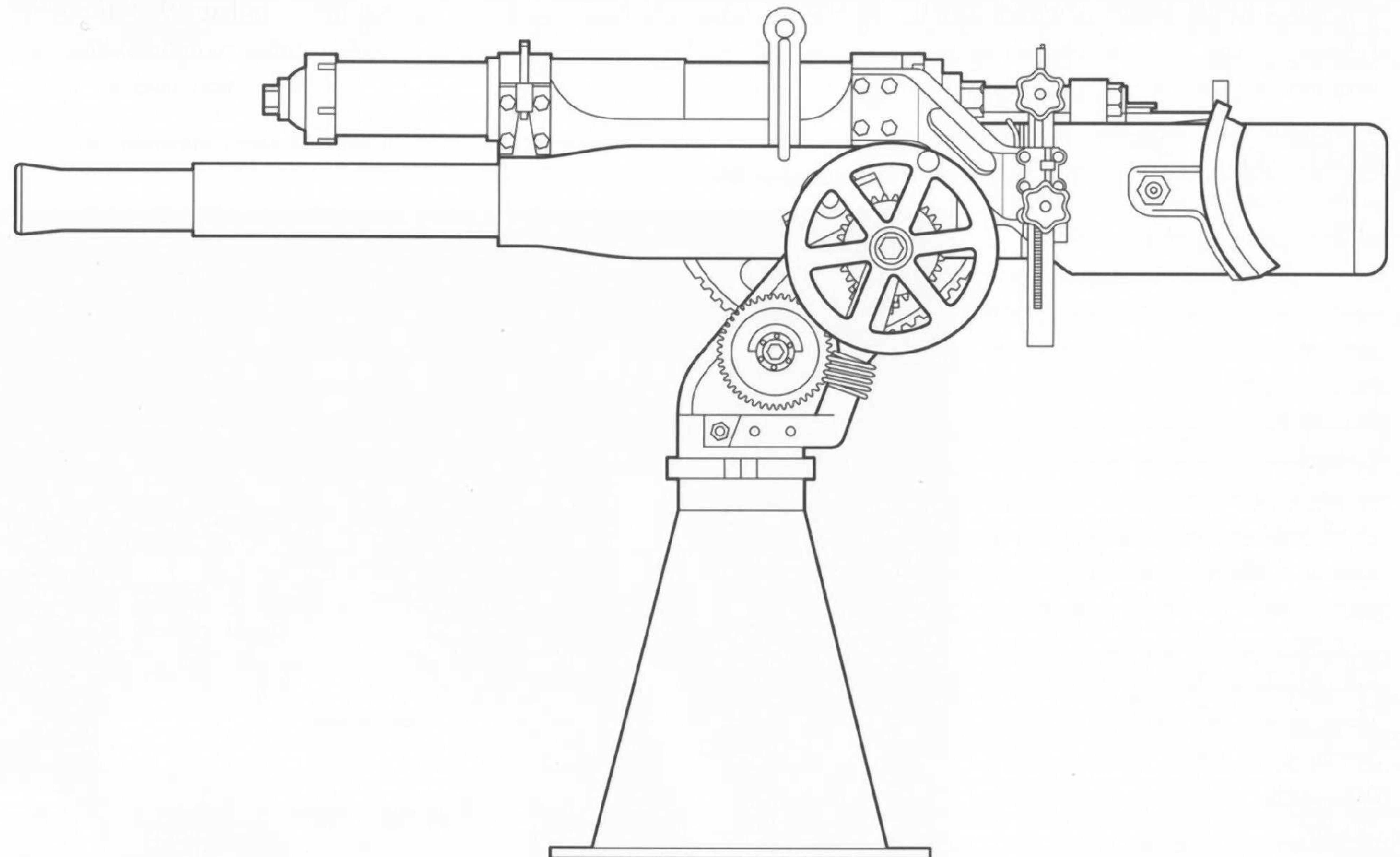
<b>Total Weight:</b>	<b>420 lbs.</b>
<b>Explosive Charge:</b>	<b>300 lbs. TNT</b>
<b>Sink Rate/Terminal Velocity:</b>	<b>8 fps</b>
<b>Settings:</b>	<b>50-300 feet</b>



## Three-Inch Deck Gun



<b>Gun Weight</b>	Mark 9 Mod 0 with BM: 749 lbs.
	Mark 13 Mod 0 with BM: 531 lbs.
	Mark 14 Mod 0 with BM: 593 lbs.
	Mark 14 Mod 1 with BM: 658 lbs.
<b>Muzzle Velocity</b>	1,650 fps
<b>Bore Length</b>	69 inches
<b>AA Ceiling</b>	18,000 feet at 75 degrees
<b>Range</b>	8,800 yards at 45.3 degrees in WWI
	10,100 yards at 45 degrees in WWII
<b>Rate of Fire</b>	8-9 rounds per minute





## Camouflage

Unlike the PT boats of World War II, the SC-497 Class subchasers were not painted in different greens, as camouflage matched to the areas in which the boats operated. The SCs were instead painted in the overall gray Measure 21 or Measure 22 schemes.

Measure 21 involved the use of Navy Blue (5-N) on all vertical surfaces and Deck Blue (20-B) on all horizontal surfaces, including the decks and life rafts. Canvas gun covers and canvas "dodgers" were dyed a color that matched Deck Blue. Under Measure 22, Navy Blue (5-N) was applied on vertical surfaces of the hull up to the lowest point of the main deck. Haze Gray (5-H) was applied to all remaining vertical surfaces, masts, and small gear located on deck. Horizontal surfaces, such as decks, were painted Deck Blue (20-B). As with Measure 21, life rafts, gun canvas covers, and canvas "dodgers" were also dyed to match Deck Blue (20-B).

A modified Measure 31 camouflage scheme was, however, applied to the hulls of Patrol Gunboat Motors (PGMs) 1 through 8, after they were converted from SCs. Measure 31 usually provided for the application of the following four paints:

- Haze Gray (5-H)
- Ocean Gray (5-O)
- Black
- Deck Blue (20-B)

Canvas coverings and "dodgers" were dyed to match Deck Blue (20-B), but the bottoms of the SC-497 Class vessels, as well as the PGMs that were converted from these hulls, were painted with Copperoyd, the same anti-fouling paint that was used on the bottoms of PT boats.

## The 110-Ft. Patrol, Motor Gunboat (PGM)

In late 1943, the USN saw that the Japanese forces were beginning to use heavily armed and armored landing barges to supply their troops in the Solomon Islands. The standard gun armament package of the early PT boats, which consisted of two twin .50-caliber machine

guns in turrets and the Oerlikon 20mm gun, were not having much success against the armor of the barges. Something had to be done, and the 110-foot PGMs that were built on the hulls of the 110-foot wooden-hull SCs proved too slow to accompany the PT boats.

Originally, to comply with the PT commanders' requests, the Navy came up with the idea of converting the 110-foot SC hull to the specifications of a PGM. This conversion entailed cutting the SC's superstructure down and replacing it with an open bridge that was similar to that found on a PT boat. Additionally, all of the SC's Anti-Submarine Warfare gear was removed. The forward 40mm Bofors gun was replaced by a 3-inch/23-caliber gun. A 40mm gun was installed aft and four PT-style twin .50-caliber turrets were positioned abaft of the open bridge. A 60mm mortar was added, and the boats were equipped with smoke generators, similar to

those on PT boats, as well as radios and radar units, which were compatible with radar units on PT boats, for coordinating attacks.

It was thought that the 110-foot wooden-hull subchasers would be the best choice for the role of gunboat because they had a shallow draft and possessed good maneuverability. The Japanese tended to operate their landing barges in small harbors and rivers, so confronting

**The wherry, Carley floats, and depth charge racks are seen installed on the afterdeck of the SC-648 in this photograph. (NARA)**





them required vessels with a shallow draft and excellent maneuverability. Eight SC-497 Class hulls had undergone the conversion to PGM configuration by December 1943. The eight boats were converted as follows:

- SC-644 became PGM-1.
- SC-757 became PGM-2.
- SC-1035 became PGM-3.
- SC-1053 became PGM-4.
- SC-1056 became PGM-5.
- SC-1071 became PGM-6.
- SC-1072 became PGM-7.
- SC-1366 became PGM-8.

To enhance maneuverability and raise their speed to more than 20 knots, these eight boats were powered by the GM 16-184A "Pancake" engines rather than straight eight-cylinder engines. Variable-pitch propellers and twin rudders enhanced the PGMs' maneuverability even more.

According to an official U.S. Navy Department memo dated 26 September 1944, the following unnecessary items were to be removed from the eight subchasers to convert them into PGMs:

- The binnacle
- The 6 ¾-inch compass
- The 5-inch compass
- The Pelorus, No. 3 and its stand (which was mounted on the top of the pilot house)

Those items were replaced by the following:

- One Gyro Flux Gate Compass of the PT boat type, and spare parts
- Two Pelorus, No. 3s, located on both bridge wings

The pilot house as well as the following items were removed:

- One helmsman's stool
- One file, weighted, sinkable
- One removable canopy, canvas, complete
- Two booby hatches and canvas covers for officers' Quarters and Engine Room hatches

These items were not needed on board the PGMs. Other alterations were the removal of all of the blocks for the boat davit and the Y-Gun roller loader davit. These items were replaced by an additional set of blocks for the new aft ammunition davit. All blocks for halyards were removed and replaced by blocks for the halyards used for signal flags and by the falls for the boat davit and halyards that were needed on board. Further, the canvas covers for the following were removed:

- The 12-inch searchlight
- The signal flag locker
- The depth charge projectors
- The 20mm gun covers

To replace these items, the following were added:

- An 8-inch searchlight cover

- The cover for the 3-inch/23 caliber gun
- Four covers for four twin .50 caliber machine guns

At this point, the Navy decided to add canvas covers for the cockpit canopy, covers for the officer's quarters and engine room hatches, and weather screens for the bridge wings and the top of the pilot house. All oil-burning lights were removed. Since the pilot house and its ports were removed, window wipers or their spare parts were not needed.

Since the depth charges and their projectors were eliminated from the boats, the beams for handling the depth charges were also eliminated. The PGMs received General Motors 20kw generating sets and the following items:

- One blinker light
- One masthead light
- One aircraft warning light
- One range light
- One set of recognition lights

PGMs 1 through 8 received the following for the radio room:

- One model TCS series equipment
- One model MN series equipment
- Two whip antennas, type 66053
- Two insulators, base for whip antennas, type 61428
- One spare insulator, base for whip antennas, type 61428

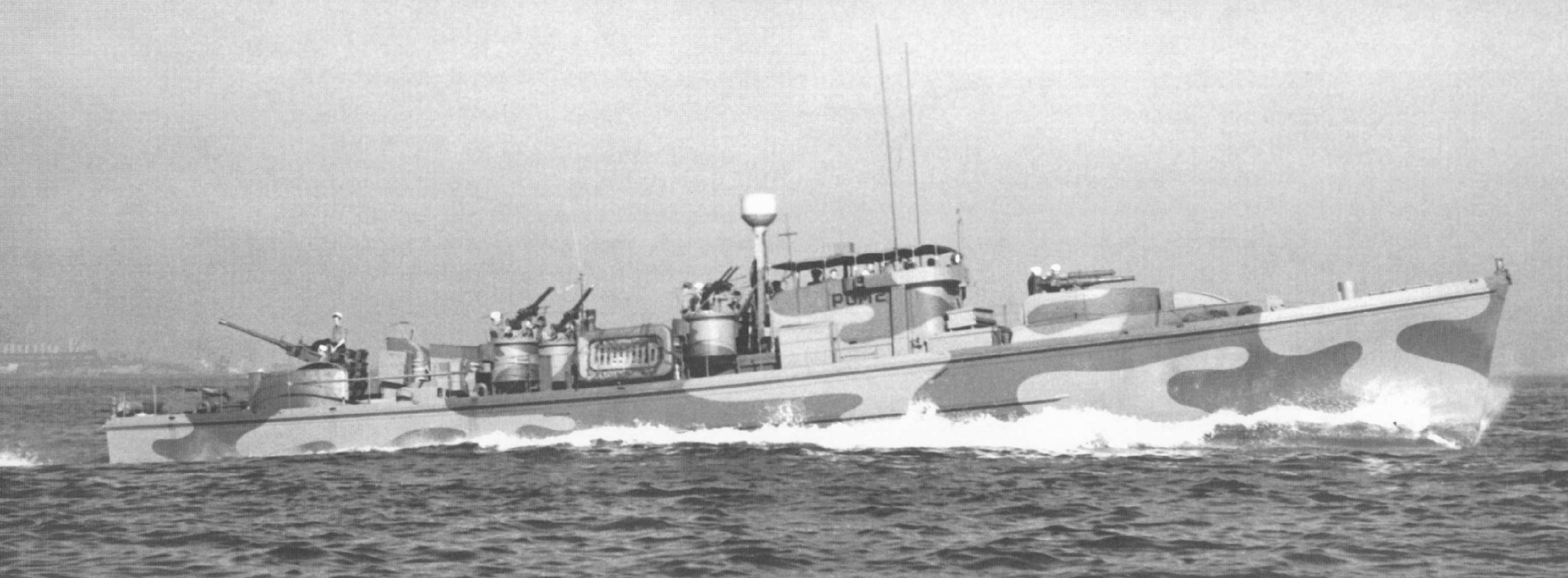
When these hulls were converted from their SC configurations to their PGM configurations, their SF Type radar was replaced with the SO-8 Type radar, a variant of the SO Type. The approved Radar Allowance for this version of the PGM stipulated that ABK radar was also given to PGMs 1 through 8.

Some of the vessels underwent another hull conversion when six of the SCs, which were operating in the Mediterranean Theater of Operations, were tasked with the responsibility of mine-sweeping in littoral waters. These conversions were done in the field in 1943. The six boats in the Mediterranean were fitted with minesweeping gear that was originally intended for use aboard German Raumbooten (vessels used for minesweeping, patrol, and anti-submarine duties). The Raumboot was similar in size and appearance to the pre-war Schnellboot. In 1945, the Navy converted another 12 SCs to be used as Minesweepers in the Pacific.

One other conversion of the SC hull was known as Beach Control Craft (SCC, Subchaser Control). During this conversion the forward Bofors 40mm Mark III mount was replaced with a 20mm Oerlikon on a Mark X mount. Two .50-caliber machine guns and additional radio equipment were added. The crew quarters of these converted SCCs were changed to accommodate the extra personnel that were required during beach landings.

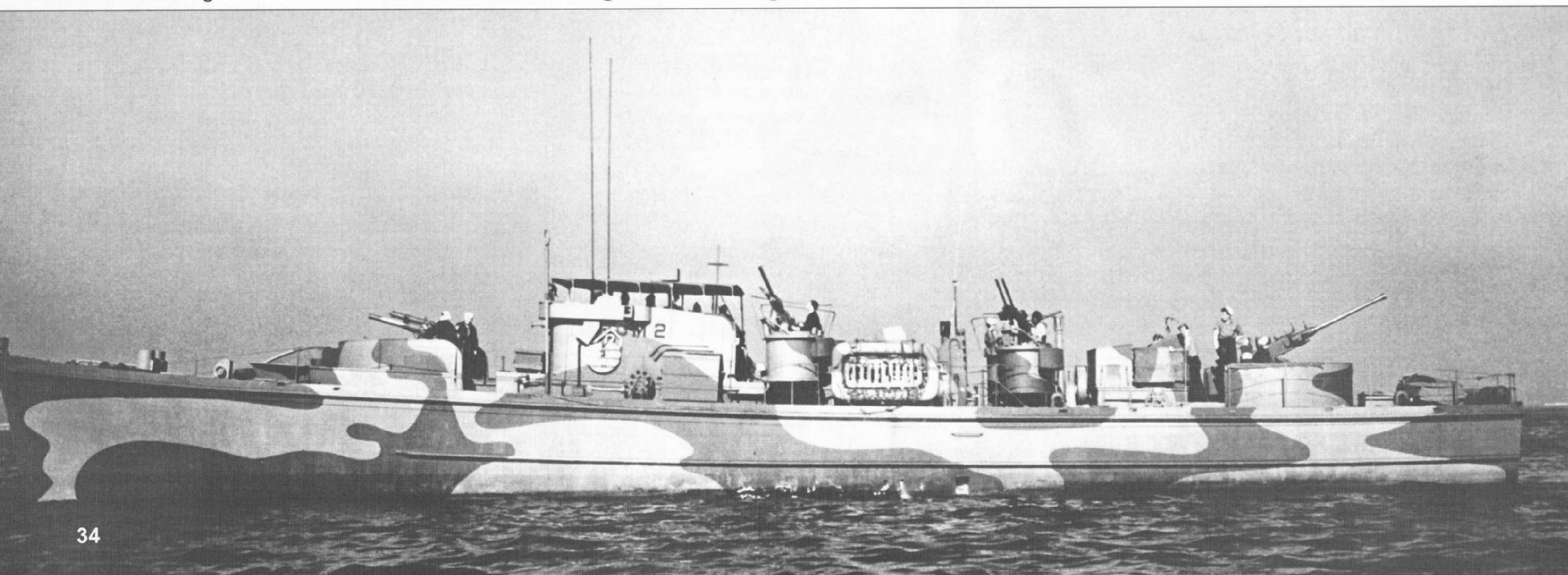
The U.S. Navy ordered 475 of the wooden-hull 110-foot SCs, of which 37 were cancelled, and 438 were taken in by the Navy. The cost of each vessel was \$500,000. Under the Lend-Lease Program, whereby the United States provided military hardware to its allies, Brazil, France, Mexico, Norway, and the Soviet Union received a total of 142 SCs - Mexico and Norway receiving three each, Brazil receiving eight, France getting 50, and the USSR, 78.





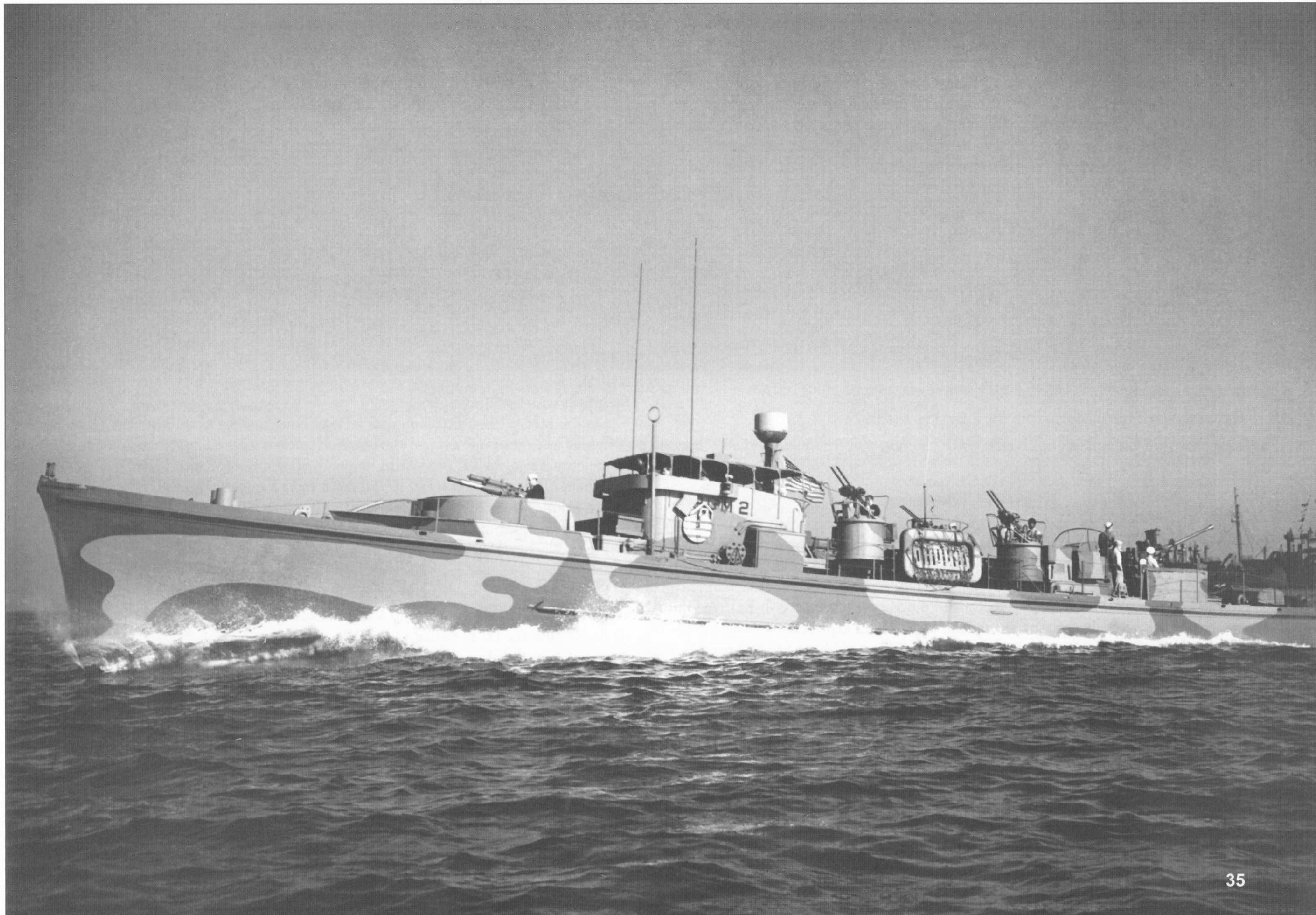
PGM-2 was painted in a modified Measure 31 scheme and had a 3-inch/23-caliber Poole gun mounted on her fore deck when she was photographed during trials. (NARA)

The four machine gun turrets on the PGM were of the same design as the machine gun turrets on PT boats. (NARA)





PGM-2 is seen here on builder's trials. The SO-8 radar is visible abaft of the cockpit on a PT-style tripod mast. PGM-2 was built at Robinson Marine Construction and was commissioned as SC-757 on 24 July 1943. (NARA)





## European Theater Operations

Early in the Second World War, the SCs were used as convoy escorts, and they also searched for survivors of ships sunk by U-Boats or in other tragedies. Early in the morning of 7 January 1943, all of the SCs based in Cape May, New Jersey, were sent out to search for survivors from an escort vessel that had been rammed by a merchant ship the night before. SC-1354 found 17 bodies, all wearing life-jackets, but there were no survivors.

Some time later, the same SC was escorting a U.S. submarine from Delaware Bay to New York. Because there was a fear of German submarines along the East coast, American submarines found themselves at risk from nervous crews of merchant and naval vessels and required escorts to protect them from friendly fire. With their low profiles, the SCs also resembled surfaced submarines, so both vessels flew the biggest U.S. flags that they could get, and SC-1354 used signal lamps to signal any ships that came near while the SCs positioned themselves between any ship and the submarine. Luckily, both vessels got to New York without incident.

By mid-1943, task forces were being sent across the Atlantic from the United States. The third task force to be sent was made up of the following 86 ships:

- 31 Landing Ship, Tanks (LSTs)
- 37 Landing Craft Infantry (LCIs)
- One tanker
- One net tender
- One fleet tug

The escort force was made up with the following vessels:

- Five destroyers
- Five SCs
- Three PCs (173-foot steel-hulled Subchasers)
- Two Auxiliary Motor Minesweepers (YMSs)

The SCs had to refuel and re-provision every three days, but, they made it to Gibraltar and then went on to whatever port in the Mediterranean that would become their base. SCs did have a low-profile and could be mistaken for an enemy submarine. During the early morning hours of 14 July 1943, SC-1030 was operating along the southwest coast of the island of Sicily when the 173-foot steel-hull PC-591 challenged the SC with its blinker-light. Even though the SC answered the challenge successfully, the larger vessel kept bearing down on the SC and finally rammed the smaller vessel on the starboard side amidships. PC-591 cut a V-shape in the SC's hull that ended just four feet from its keel. The collision destroyed the 1030's starboard engine and flooded its engine room with six feet of water. No one was injured as a result of the collision, however, one of the SC's crewmen was thrown from the SC's flying bridge to the bow of the PC. The smaller wooden SC was then lashed to the port side of the steel-hulled PC to prevent her from sinking. Fortunately, the SC did not sink and a tug was sent to tow her back to the port in Bizerte, Tunisia. From there, she was sent to Algiers for a period of dry-docking and repairs. Later, the 1030 returned to service and took part in the Invasion of Southern France.

In another incident, two SCs, the 694 and 696, were lost in a bombing raid in Sicily. Three SCs, the 771, 696, and 694, were moored together in the harbor of Palermo, Sicily, with the

696 in the center in the early morning hours of 26 August 1943. An air-raid alarm sounded at a little after four o'clock in the morning, which immediately prompted the 771 to move away from the other two boats.

At approximately 4:20am, after hearing the sound of a plane in a steep dive, the commanding officer of the 694, Lt. Roger Robinson, ordered his boat to get underway and the guns on the vessel to open fire on the enemy aircraft. Before they could, an explosion racked the 696 as a 500-pound bomb struck the boat's flying bridge. The bomb went through to the main deck and exploded in the forward fuel compartment.

Burning debris from the stricken 696 fell onto a British merchant ship that was 200 feet away and onto the 694. The SC caught on fire. An hour later, both the 694 and 696 exploded and sank, after the fires had reached their ammunition magazines. A total of 24 men were killed on both boats, and another 23 were wounded.

SCs frequently were used in the SCC (Beach Control Craft) role. The "lead-ship" of the class was used in the landings at Anzio, Italy, in January 1944. That boat was SC-497, which served as the "control vessel" for the second wave of landing craft and on 22 January 1944, was stationed, for 10 days, off the Anzio beach-head as part of a group of 14 SCs.

During the landings, the 497 led the Landing Craft, Vehicle, Personnel (LCVPs) from their mother ship, the LST-379, to the vicinity of the primary control vessel, which was the 173-foot steel-hulled PC-626. After the primary control vessel signaled the 497, the SC then led the LCVPs in toward the beach. Once there the SC was ordered to lay smoke to cover the landings. She also rescued survivors of a minesweeper that had hit a mine, and she destroyed five mines with her 40mm gun.

On 2 February 1944, a collision with a Royal Navy Landing Craft, Tank (LCT) damaged the 497's bow severely enough to force it to port in Naples for repairs. During the 10 days the boat was on station at Anzio, the 497 expended 170 rounds of 40mm ammunition and 70 rounds of 20mm ammunition. It is believed that the 497 laid down enough smoke to blanket all of Rhode Island.

On 6 June 1944, Allied Forces landed in Normandy, in northern France, and opened a second major front in Europe. This landing force was the largest armada ever assembled to that date. Nineteen SCs took part in the armada as escorts, control vessels, or a combination of both.

One SC, the 1354, was assigned to escort a group of LCTs from England to Omaha Beach and then, upon arrival there, was to act as the secondary control vessel for "Dog Red Beach." As the SC and the LCTs neared Omaha Beach, they were joined by a group of LCVPs. The skipper then signaled to the LCTs and LCVPs that the 1354 was now the secondary control vessel for that beach. He then authorized the landing craft to proceed to the beach. After the first day of the landings, the SC-1354 patrolled the beach area, was tasked at being a messenger boat, and stayed on station until July.

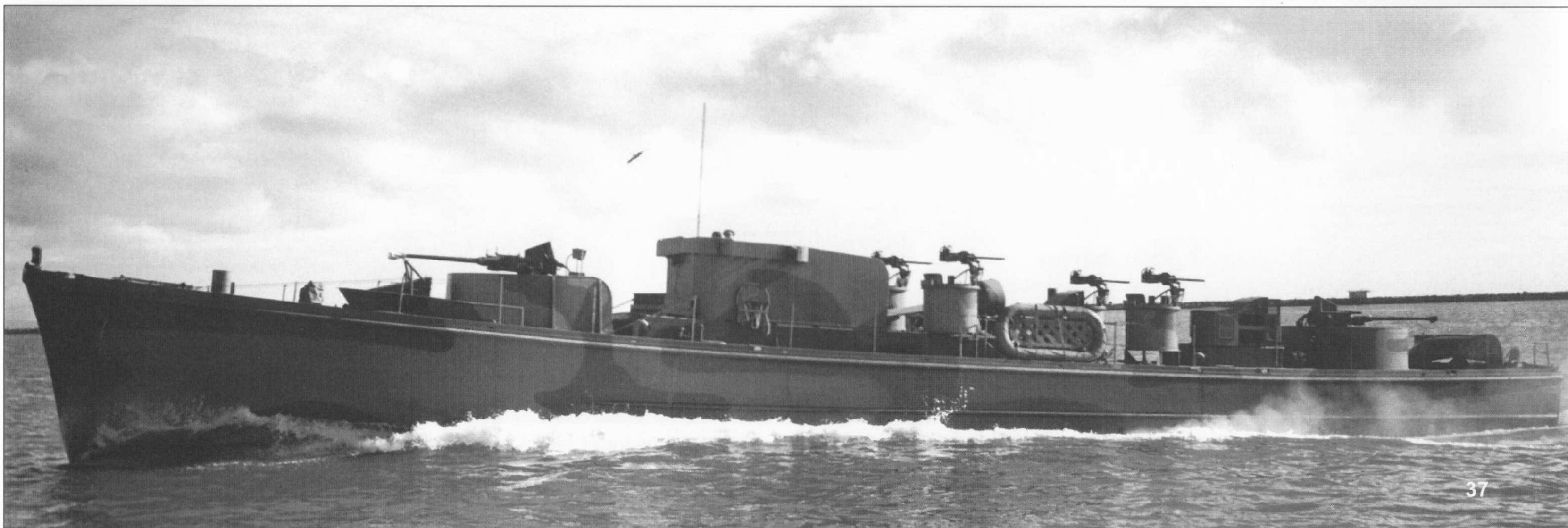
The SCs were used again in August 1944, during the last major amphibious landing in Europe, in the south of France. These landings were code-named Operation Dragoon and took place in the area of Nice, St. Tropez, and Marseilles. While in European waters, the SCs exhibited their capabilities to the fullest by serving as control vessels for landing craft, laying smoke screens and mines, ferrying personnel, and conducting anti-aircraft defense and rescue, in addition to the conducting standard patrol and anti-submarine work.





In principle, the conversion of 110-foot SC Hulls to PGM configuration would facilitate joint operations with PT boats. In practice, however, the PGMs proved too slow to operate successfully with the PT boats. (NARA)

Some of the 110-foot PGMs came from the builder with two 40mm guns. The forward-positioned 3-inch/23-caliber Poole gun on PGMs was often replaced with a 40mm in the operating area. (NARA)





On one patrol in the English Channel on 20 April 1945, SC-1290 was returning to base in Weymouth when a radio message reporting a sub contact came in from Subchaser 1321. The 1290 came to general quarters and changed course to assist the other SC. While the 1321 made her attack and dropped five depth charges, the 1290 stood clear.

SC-1290 then attacked the enemy sub with Mousetrap rockets but using data that the 1321 had provided while in its initial assault. Four of the 1290's rockets, which were designed to explode only on contact, went off at a depth at about 120 feet. Some of the crew reported seeing an oil slick, but they could not confirm a kill. Thus, the SC dropped two depth charges.

After turning to port, the SC picked up a strong sonar contact. The 1290 dropped five more depth charges in a diamond pattern after which, crewmen on the SC observed a black hull rise up from the deep, roll over, and slip back under. Further observation of this object was marred by the explosion of the fifth depth charge. Soon afterwards, the 1321 went off to join the convoy that she was tasked with escorting, and the 1290 was joined by SC-1330.

The SC was now joined by the Royal Navy Destroyer, HMS Tamby, and later, the SC-1358. The 1290 made two more attacks, both of which resulted in the crew seeing more oil slicks, one of which had thick black oil. Aware that the 1290's stock of depth charges and Mousetrap rockets had been exhausted, the SC's skipper directed the 1358 to launch her own attack.

Although no official German record exists to tell what U-Boat was lost that day. The U-Boat was either the U-1169 or the U-235. Both submarines were operating in that area that day, and both ended up being lost in action against the Allies.

Three SC-497 Class SCs (SC-683, SC-718, and SC-1061), which had been used as supply boats and ferries between Britain and German-occupied Norway, were turned over to the navy of the Norwegian government-in-exile in October 1943. The SC-683 became the Hessa; the SC-718 became the Hitra; and the SC-1061 became the Vigra.

The armament packages on the three vessels were modified before the SCs were transferred

to the Norwegians. The changes included removal of the depth charge racks and Mousetrap projectors, and the replacement of the K-Guns with an additional dinghy. The two dinghies had special outboard motors with special mufflers to keep them quiet. One of the 20mm Oerlikons was replaced with a British 2-pounder aft, and two .50-caliber machine guns were mounted on the flying bridge. These three SCs would operate out of the Shetland Islands, in the North Sea, and the boats became known as the "Shetland Bus."

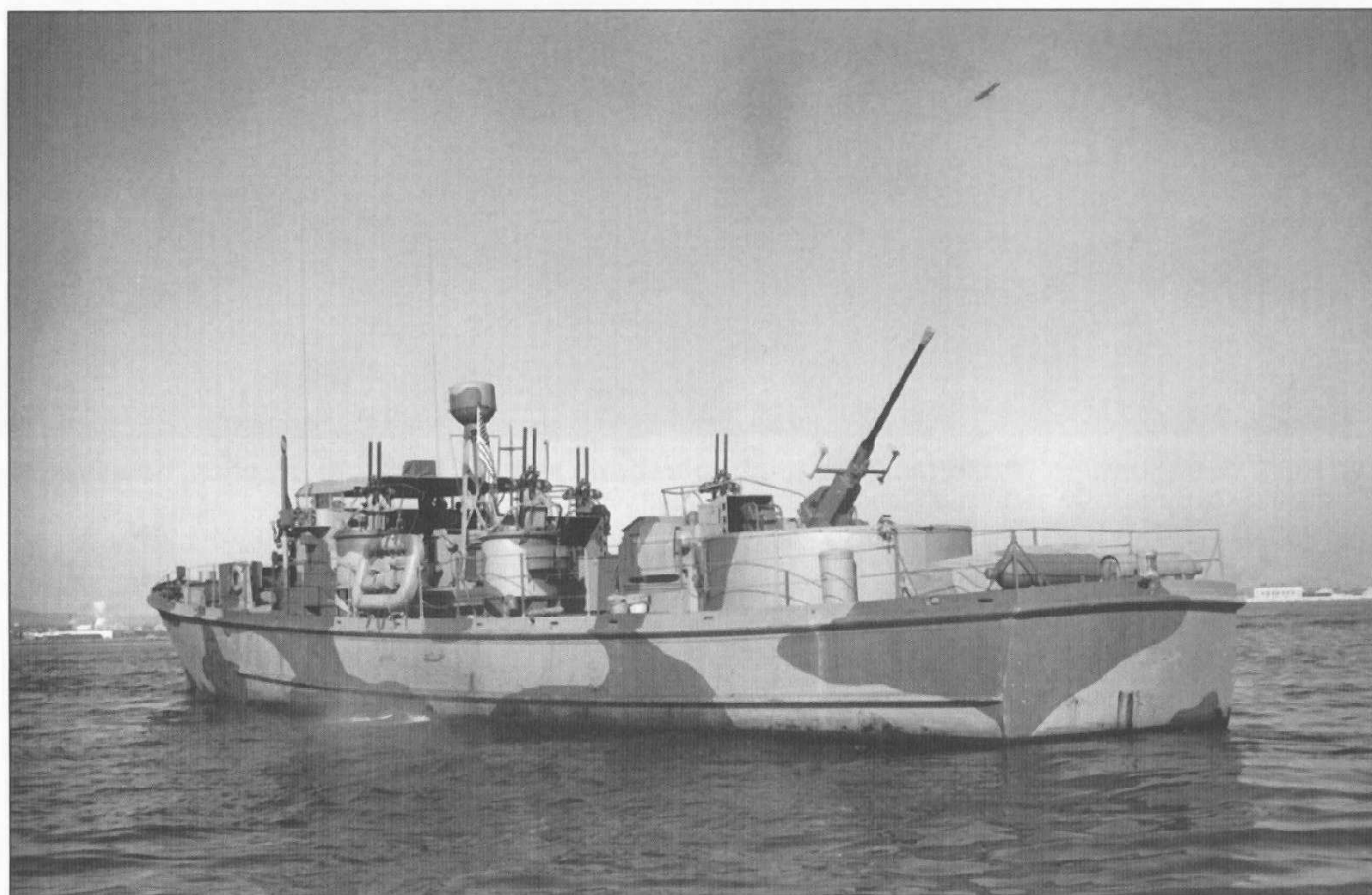
On one mission, the Vigra was sent to rendezvous with some secret agents operating in German-occupied Norway. In her approach to the Norwegian coast, the Vigra passed a group of Kriegsmarine vessels moored near the rendezvous point. A convenient snow storm concealed the SC as it sailed past the German vessels during her approach, but then as the crew awaited the arrival of the agents, the weather began to clear and the SC had to take cover behind a near-by island.

A search party set off in one of the SC's dinghies to look for the secret agents, who had failed to show up. Meanwhile, the rest of the crew spent the night hiding from the Germans. Once the search party was recovered, the Vigra returned safely to its base in the Shetlands. The Hitra was sent on a similar secret mission, during which the SC skippers were instructed to avoid any contact with the enemy wherever possible. As Hitra approached Sunnfjord to pick up an agent, her crew noticed that a Kriegsmarine patrol boat was checking out the shoreline and investigating each cove and creek. The SC's skipper decided to move away rather than risk discovery.

Slipping away proved to be a good tactical move, as it was later learned that a ship had been torpedoed and lost 11 men. At the time the Hitra showed up on the scene, German minesweepers were combing the area for submarines and survivors. The Hitra would have been out-numbered and out-gunned had she sailed into that situation. The three SCs that were transferred to the Norwegians carried out 116 missions, in the course of which they put ashore 192 agents, delivered 383 tons of stores and equipment, and saved 373 refugees.

Of the three, only the Hitra survives today. The once-proud subchaser was found by accident in 1983, her hulk half sunk and rotten. She was restored back to her wartime configuration, however, and Hitra is currently operational. She can be seen at the Norwegian Naval Base near Bergen.

**In January 1944, the PGM-6 was armed with 40mm guns fore and aft. The guns are shielded, however, unlike those on PT boats. (NARA)**

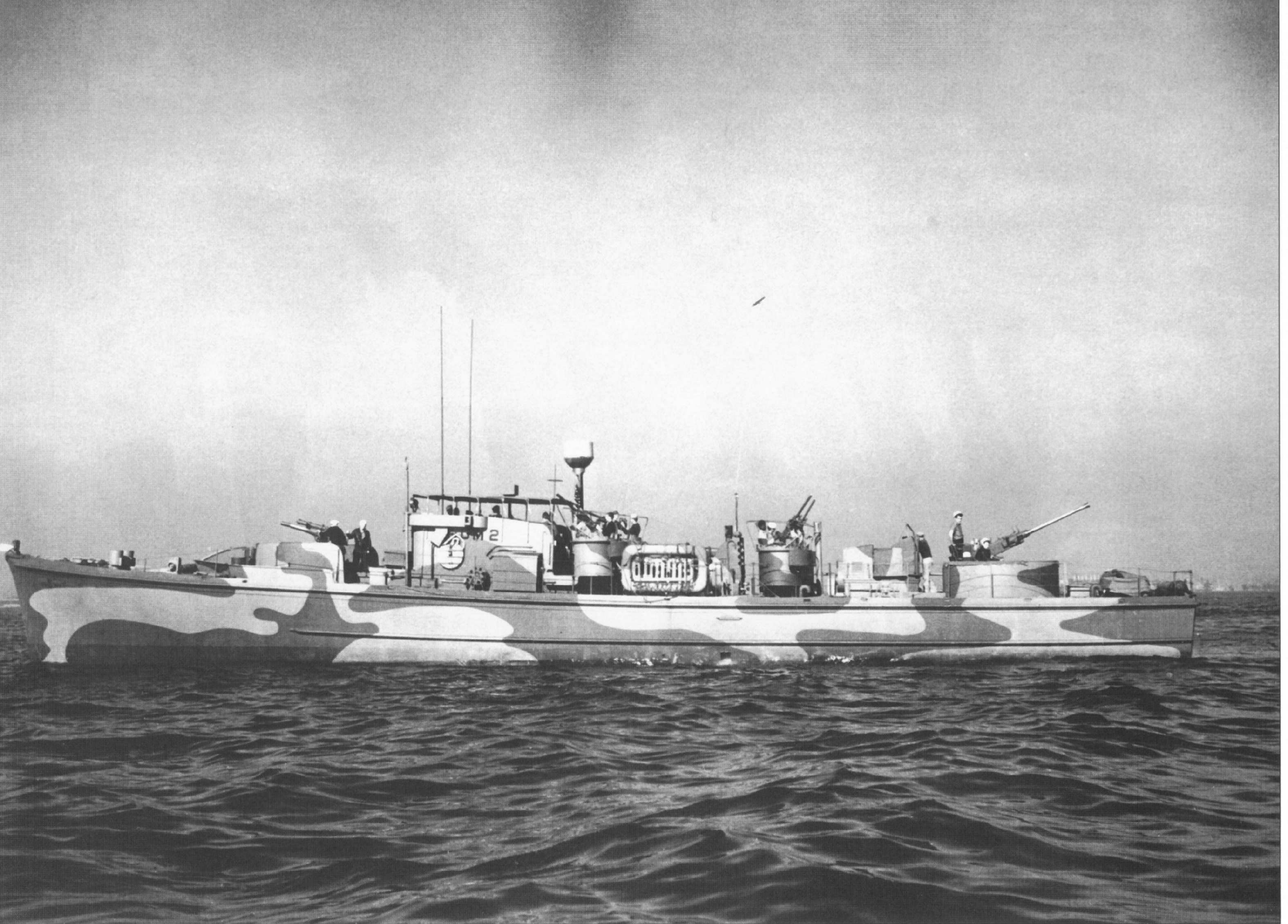






Like her sister in the photo on the preceding page (38), the PGM-7 is armed with two 40mm guns fore and aft, although the forward gun in this photo is frequently misidentified as a 3-inch/23-caliber Poole gun. Both the PGM-6 and PGM-7 are seen fitted out with two PT-style smoke generators. (NARA)





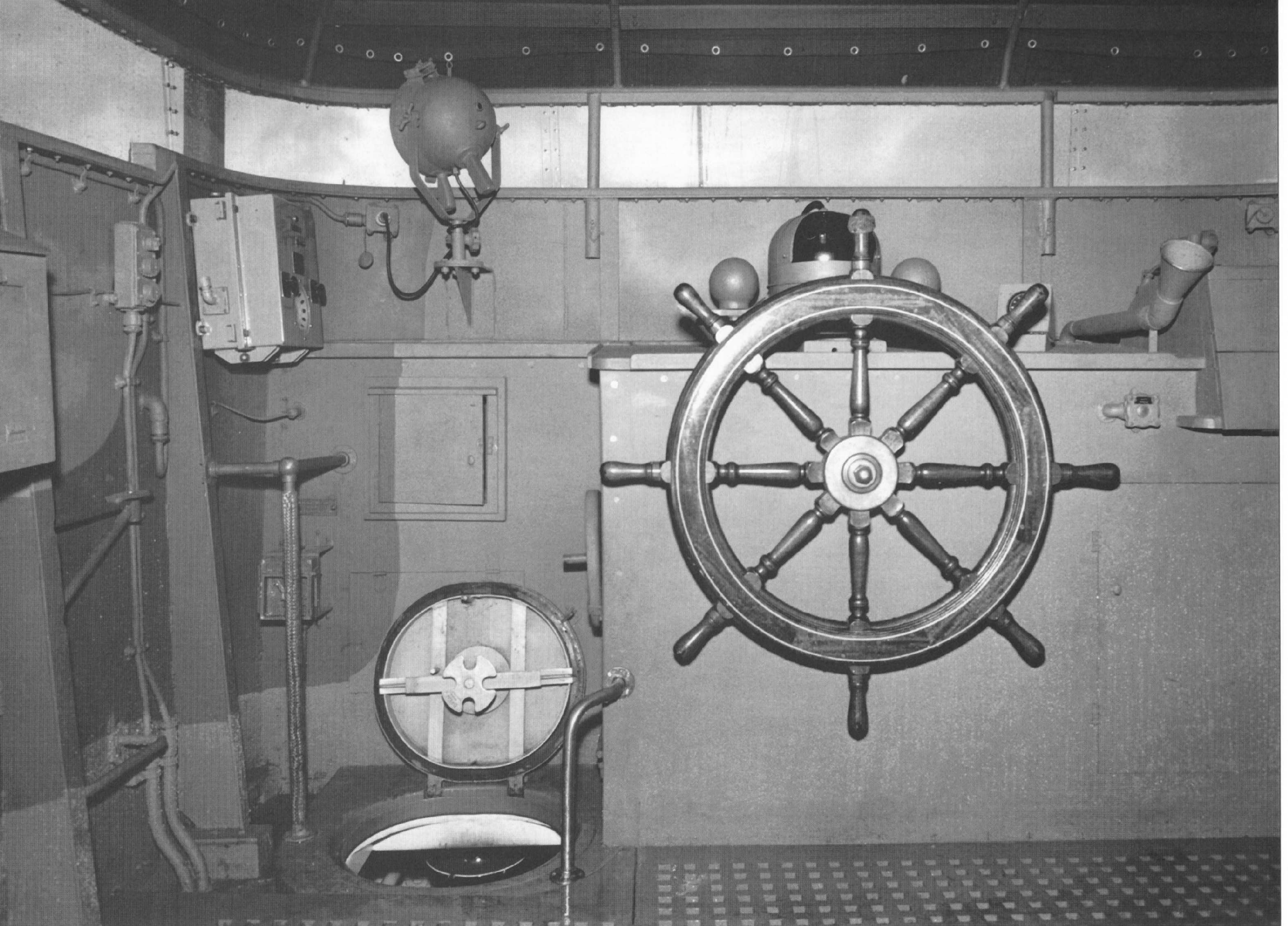
The weapon fixed on the foredeck of the PGM-7 in this January 1944 photo was a 3-in/23-caliber Poole gun. (NARA via B.G. Marshall)





The PT-style tripod mast for the radar can be seen on the right in this view of the cockpit area aboard a PGM. (NARA)

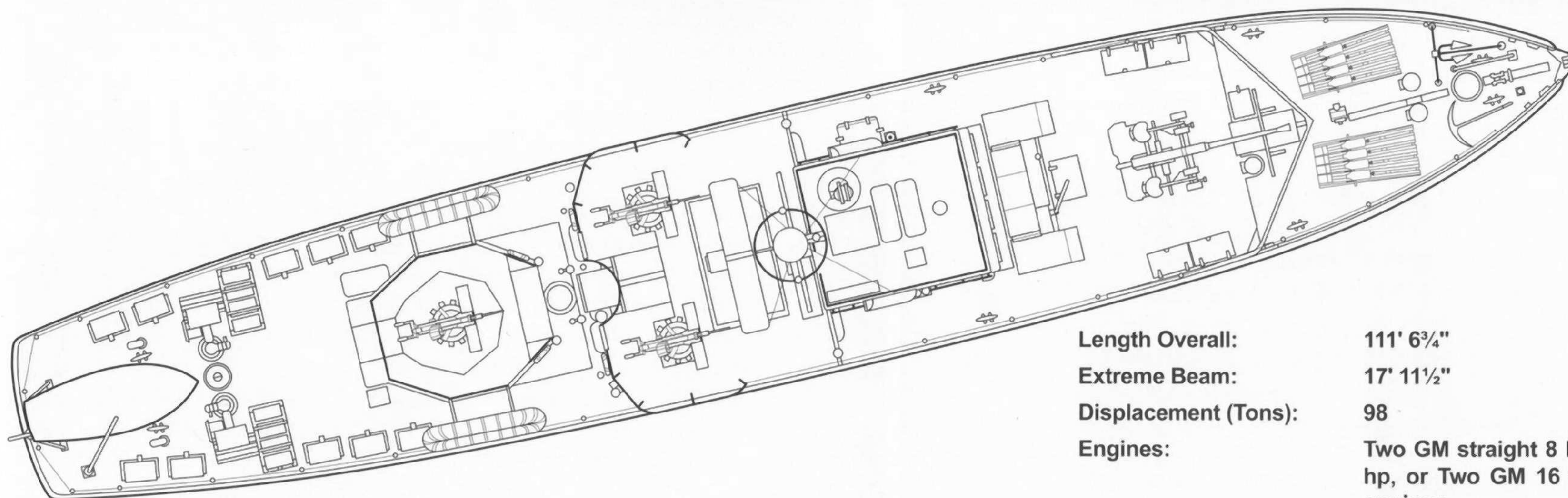




A large wooden steering wheel dominates this view of the Spartan layout of a PGM cockpit area. (NARA)

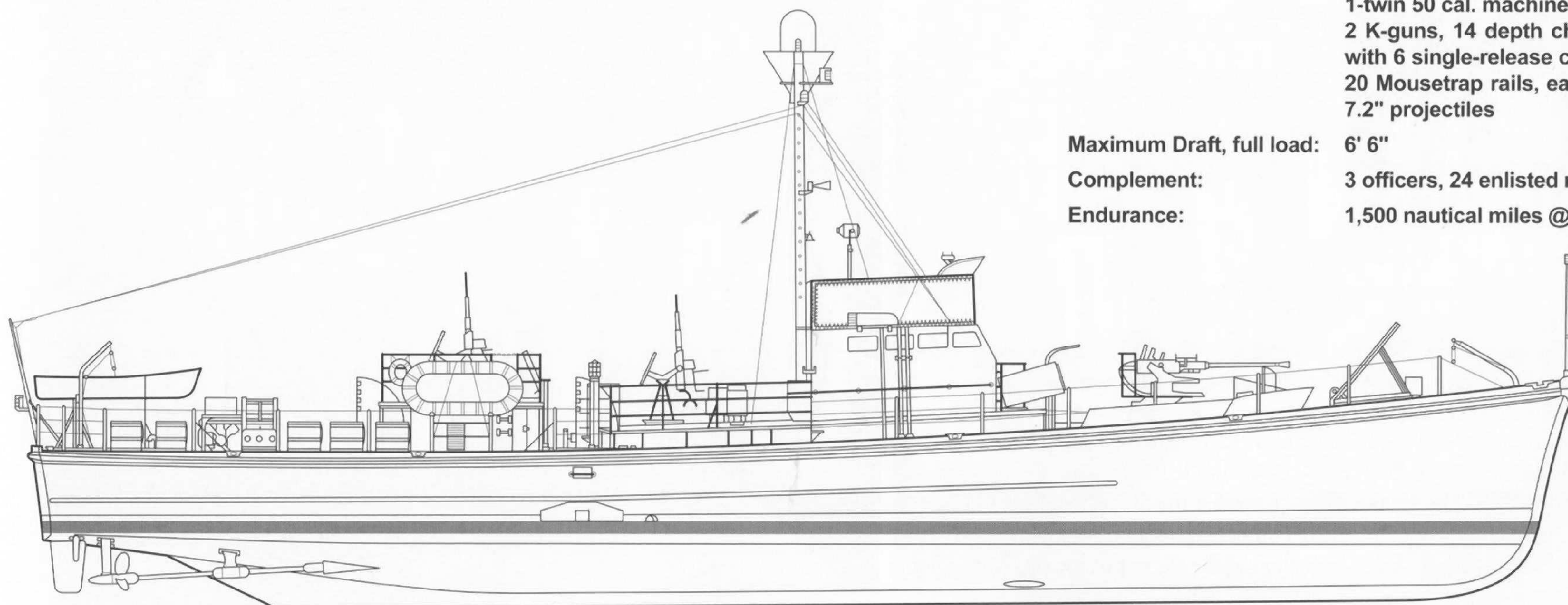


## SC-497 Class



Twenty WWII subchasers (SC-497 class) built by Luders Marine Construction Co. of Stamford, Connecticut, were 110' 10" long rather than 111' 6 $\frac{3}{4}$ ".

Length Overall:	111' 6 $\frac{3}{4}$ "
Extreme Beam:	17' 11 $\frac{1}{2}$ "
Displacement (Tons):	98
Engines:	Two GM straight 8 Diesel (8-268-A) 1,440 hp, or Two GM 16 cyl. 184-A "pancake" engines
Speed:	15.6 knots or 21 knots
Armament:	1-40mm Bofors or 1-3/50 cannon (forward), 3-single 20mm Oerlikon (midships), 1-twin 50 cal. machine gun (optional) (aft) 2 K-guns, 14 depth charges 300 lb each with 6 single-release chocks, 2 sets Mark 20 Mousetrap rails, each mounted with 4 7.2" projectiles
Maximum Draft, full load:	6' 6"
Complement:	3 officers, 24 enlisted men
Endurance:	1,500 nautical miles @ 12 knots





## Pacific Theater Operations

In January 1943, nine SCs arrived at Noumea, New Caledonia, in the company of their ad-hoc mother-ship, the oiler USS Tallahassee. From Noumea, five of the SCs, the 504, 505, 521, 531, and the 668; proceeded to the Solomon Islands. Joined later by other SCs, the vessels undertook tasks as varied as serving as mail boats, ferries, and convoy escorts. They also provided anti-submarine coverage for amphibious landings and dropped off and recovered Coast Watchers.

On 29 May 1943 at 10:45 a.m., the SC-669 was in the vicinity of the harbor of the island of Espiritu Santo when it picked up a solid sonar contact. The SC, after tracking the contact for 15 minutes, commenced an attack with its Mousetrap ASW rockets and depth charges. The 669 dropped five depth charges but saw no oil slick or other indication of a hit.

At 11:30 a.m., the SC regained contact with the submarine at a distance of three miles from the Channel entrance. The SC-669 fired eight Mousetrap ASW rockets at the submerged contact from a distance of 800 yards. The rockets hit the water 300 feet ahead of the SC, and a few seconds later, two of the rockets found their target and exploded. The SC then followed up with three depth charges. This attack produced a giant air bubble that was quickly followed by another, and then, an oil slick, pieces of wood, and part of a life jacket. Contact was then lost with the target. When Japanese war records were examined after the war, it was found that the SC-669 had sunk the Japanese submarine RO-107.

In the spring 1943, the SC-738 and another SC were escorting a convoy along the East coast of Australia. The 738 was the screen commander for the convoy, one of whose ships was the Van Vlisssenberg, an inter-island transport from the Netherlands East Indies (modern-day Indonesia) that was loaded with Australian troops.

At dawn on the Monday after Easter, it was found that the transport had fallen nearly a mile behind the rest of the convoy. The 738 was sent to round up the transport and bring it back into the safety of the convoy. On its way, crewmen of the SC spotted survivors from another unknown ship that had been torpedoed the night before, and it plucked 11 men from the water.

In December 1943, the Navy dispatched a landing force of 36 ships in Task Force 76 to the island of Arawe, with the aim of establishing a PT boat base there. Three SCs, the 699, the 981, and the 742; and two coastal transports served as guide boats, conducted patrols, and provided rocket fire support.

SC-699 was assigned control duties. The other two SCs were there to fire their rockets in support of the landings. SC-699 was guiding a group of inflated rubber landing boats to the beach when the Japanese on the island opened fire on the boats with heavy machine guns. The SC pulled 69 survivors out of the ocean, 15 of them wounded, in addition to the bodies of two men who were killed.

Five Japanese Val dive bombers attacked the SC as she headed to a point of land where she could put the survivors ashore. The Japanese aircraft strafed the SC as her crew stubbornly fired back at the attacking planes. One of the dive bombers was shot down and crashed onto the beach. The rest of the planes then fled, which allowed the SC to put the survivors ashore.

By the time the island was taken, a coastal transport had been sunk.

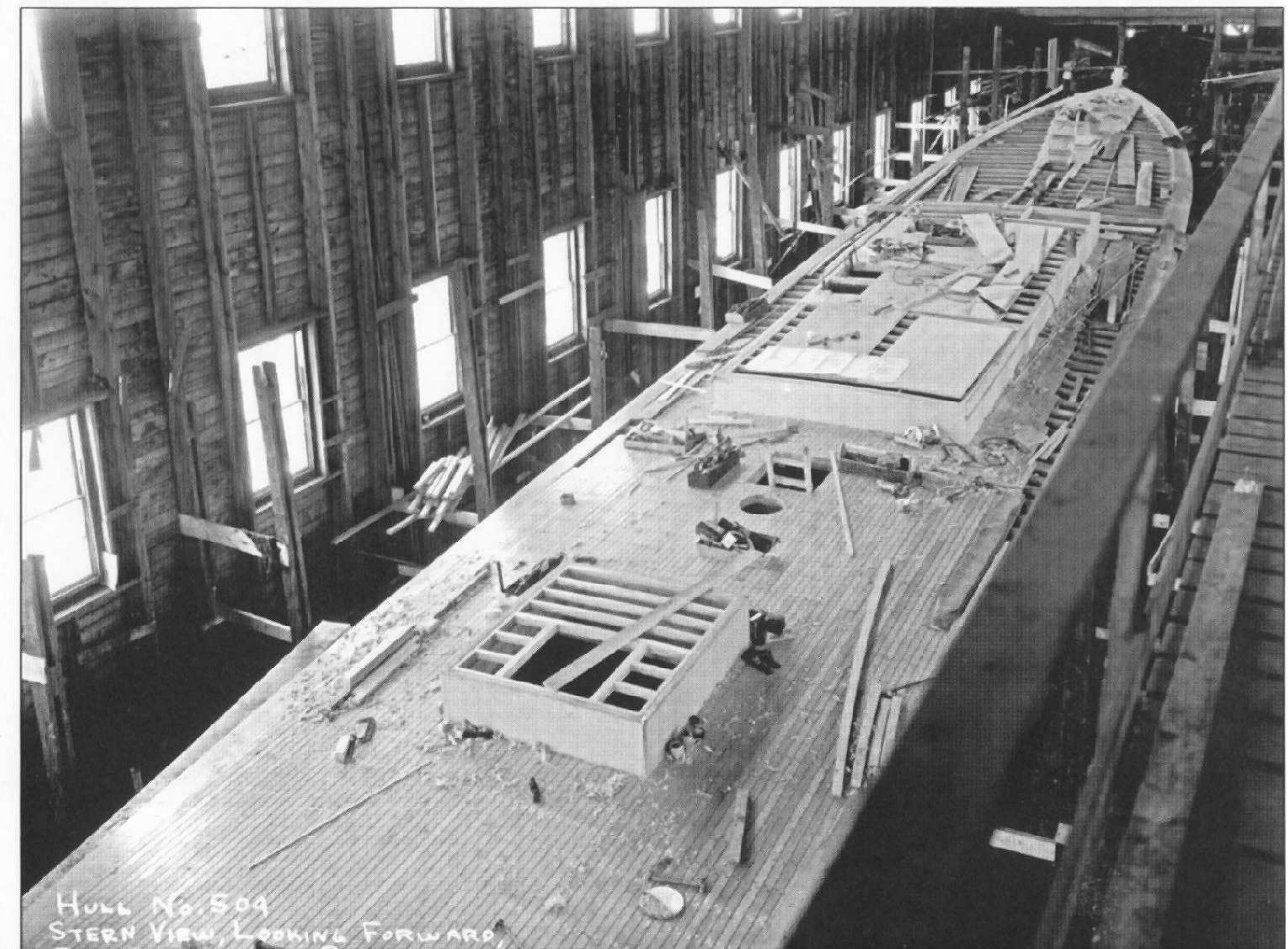
After the Arawe landings, the 699 had a reputation for always being in the thick of the action. "The Shootin' 699" was its nickname from then on. On 27 May 1944, however, her luck almost ran out. She was taking part in the operation to take Biak, the largest of the Schouten Island Group. The island was occupied by the Japanese, who had three airfields and a supply base there. A flight of four "Betty" bombers swooped in over the harbor, strafing the American vessels. Anti-aircraft fire struck the fourth of the bombers, and it began to smoke. Instead of leaving the area, the bomber swerved towards the Destroyer USS Sampson.

The Sampson spotted the oncoming aircraft and made a hard turn to port. As a result, the Japanese bomber overshot the destroyer. A wing dipped into the water, which caused the bomber to crash headlong into the SC-699 amidships. The bomber sprayed fuel all over the SC. The 699 caught fire and suffered severe damage but still managed to stay afloat. Since the SC was acting as the Inner Control Vessel, she was carrying the landing control officer, who took charge and ordered one group of crewmen to fight the fires and another group to help the crewmen injured by the impact of the bomber.

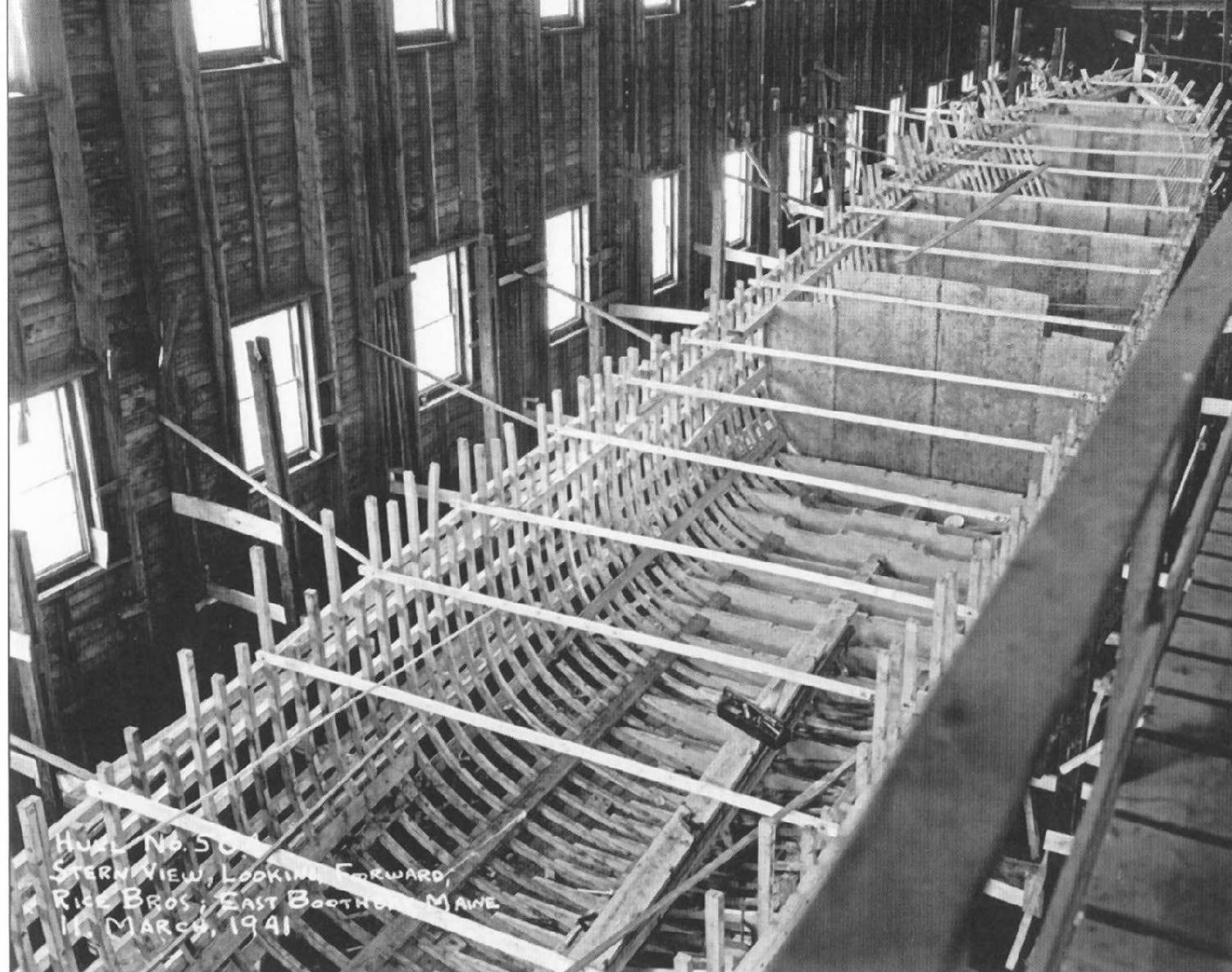
Only two crewmen were killed in the attack, and within minutes, a Navy tug pulled up alongside the stricken SC and began fighting the fires raging aboard her. The injured crewmen were transferred to an LST. An LCI came up, and the SC was secured to its side to make sure it would stay afloat. The next day, the SC was towed to Hollandia for extensive repairs. Three months later, the boat was back in action during the landings at Leyte in the Philippines.

This incident is seen as the first intentional Japanese kamikaze attack on a U.S. vessel.

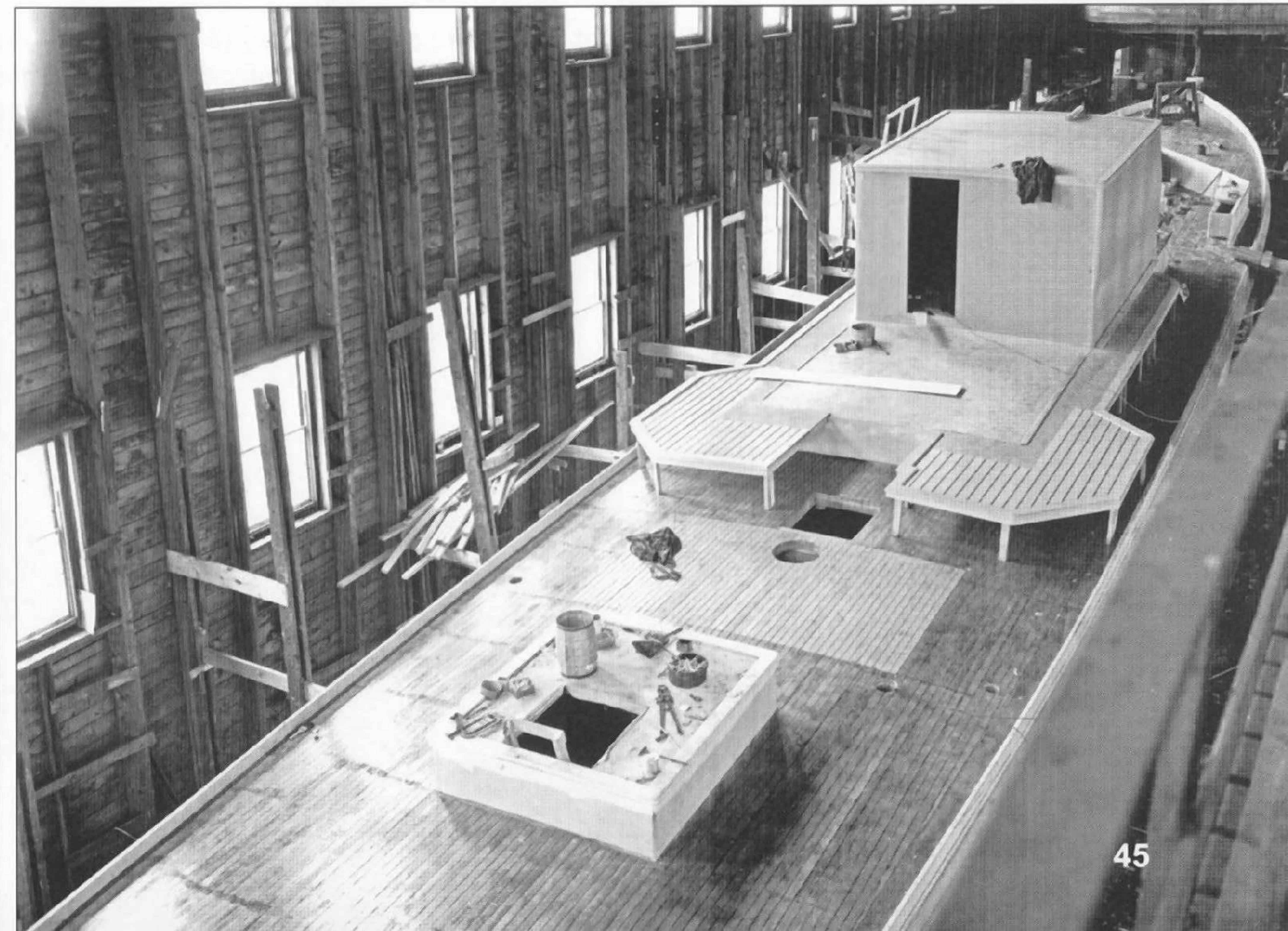
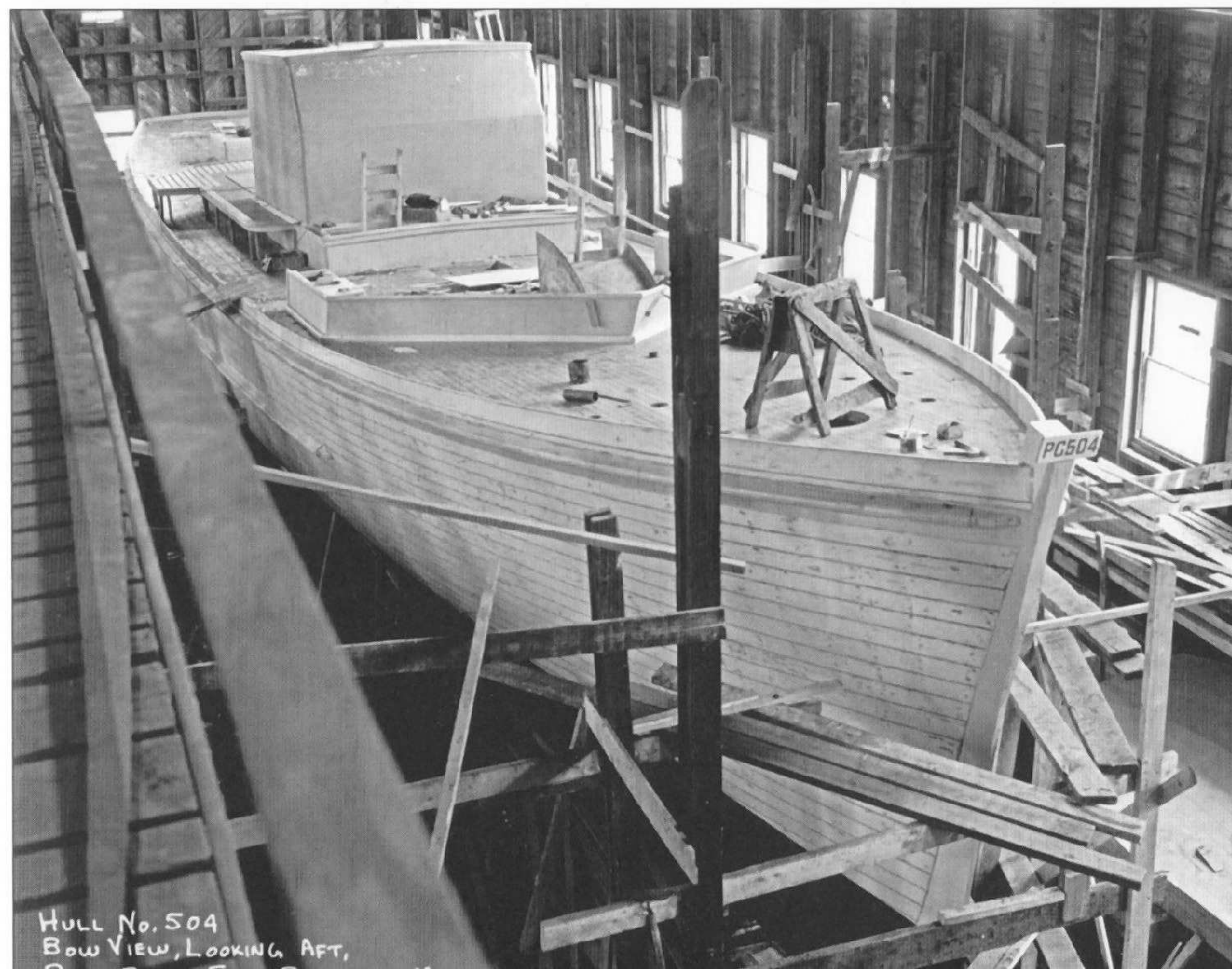
**Hull 504, a 110-foot WWII SC, was under construction in Maine in April 1941. (NARA)**



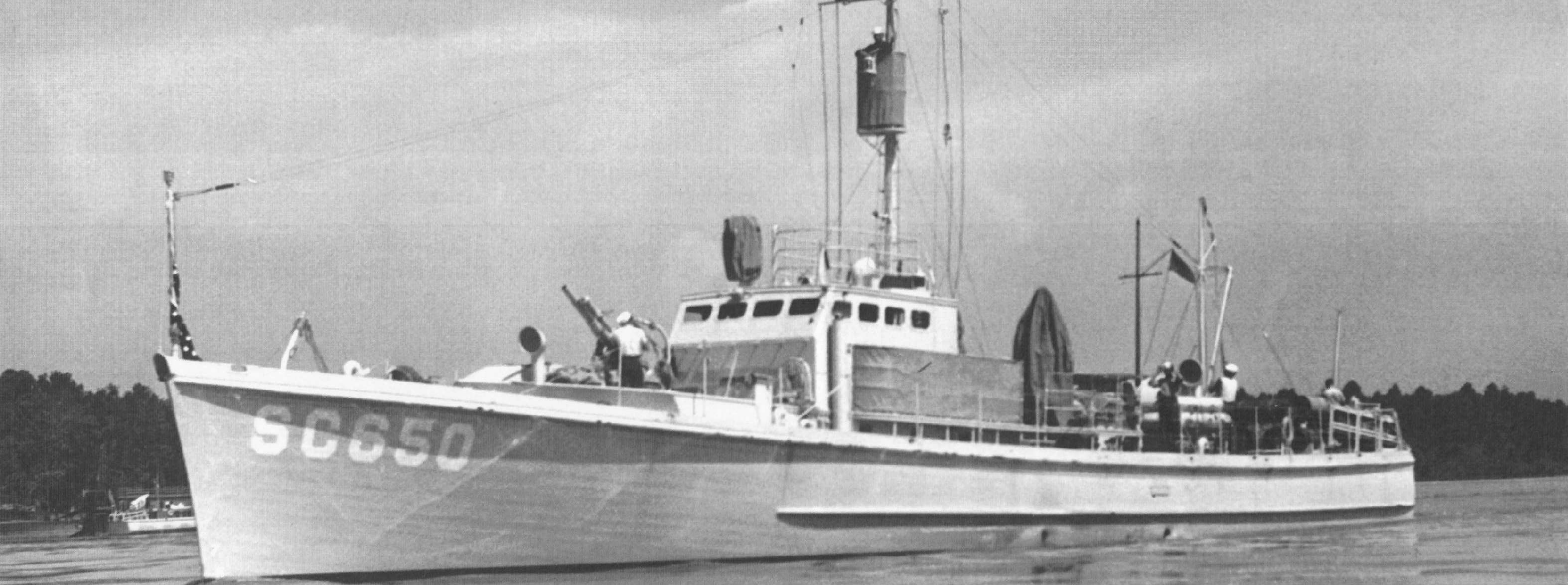




These four photographs record the progress of the construction process of Hull No. 504, an SC-497 Class subchaser, from 11 March through 6 June 1941. (NARA)







The SC-650 appears here just after her commissioning, painted in a light shade of gray that is either Light Gray (5-L) or Haze Gray (5-H). (NARA)

The SC-661 is seen here also painted in Light Gray (5-L) or Haze Gray (5-H). The hull numbers appear to be in either Black or Dark Gray (5-D). There are two water-cooled .50-caliber machine guns abaft the pilothouse. These guns were later replaced by two 20mm guns and augmented with a third one aft of them. (NARA)







Soon after her completion, the SC-696 appears to be painted in an overall Navy Gray (5-N) scheme. (NARA)



Two water-cooled .50-caliber machine guns have been replaced by two 20mm guns on shielded Mark IV mounts in this photo. A third 20mm has yet to be installed. (NARA)

The SC-696 had unusual depression rails by her two 20mm guns. A Luftwaffe bomb sank the SC-696 off Palermo, Sicily, on 23 August 1943. (NARA)

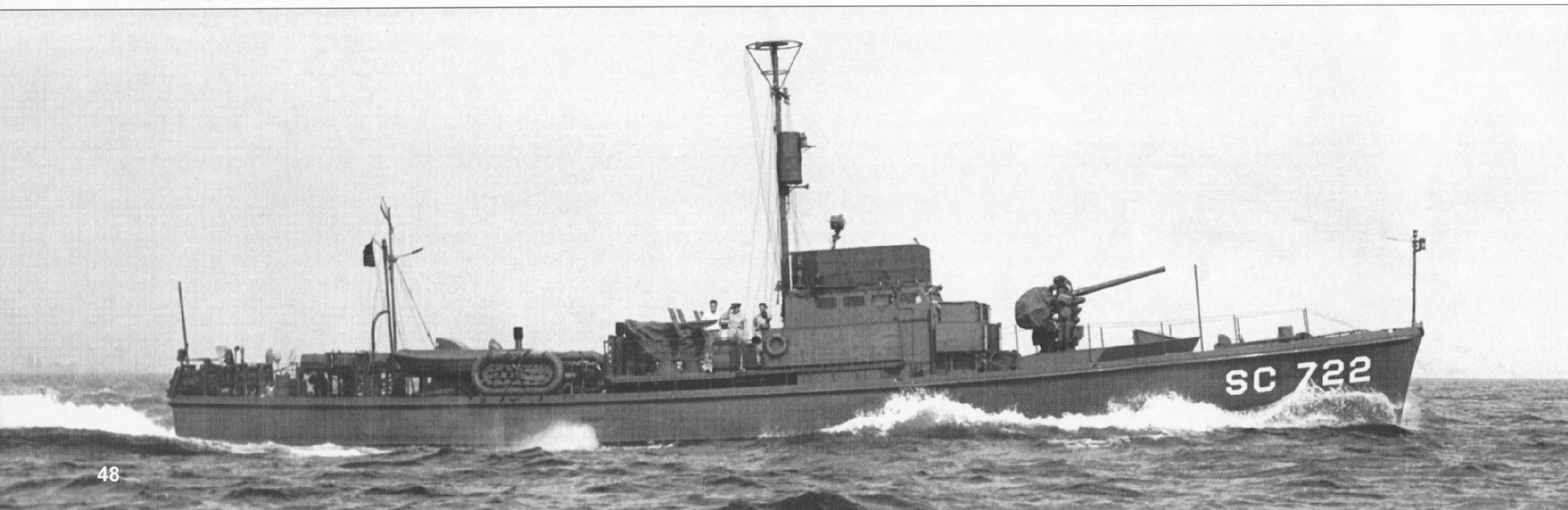




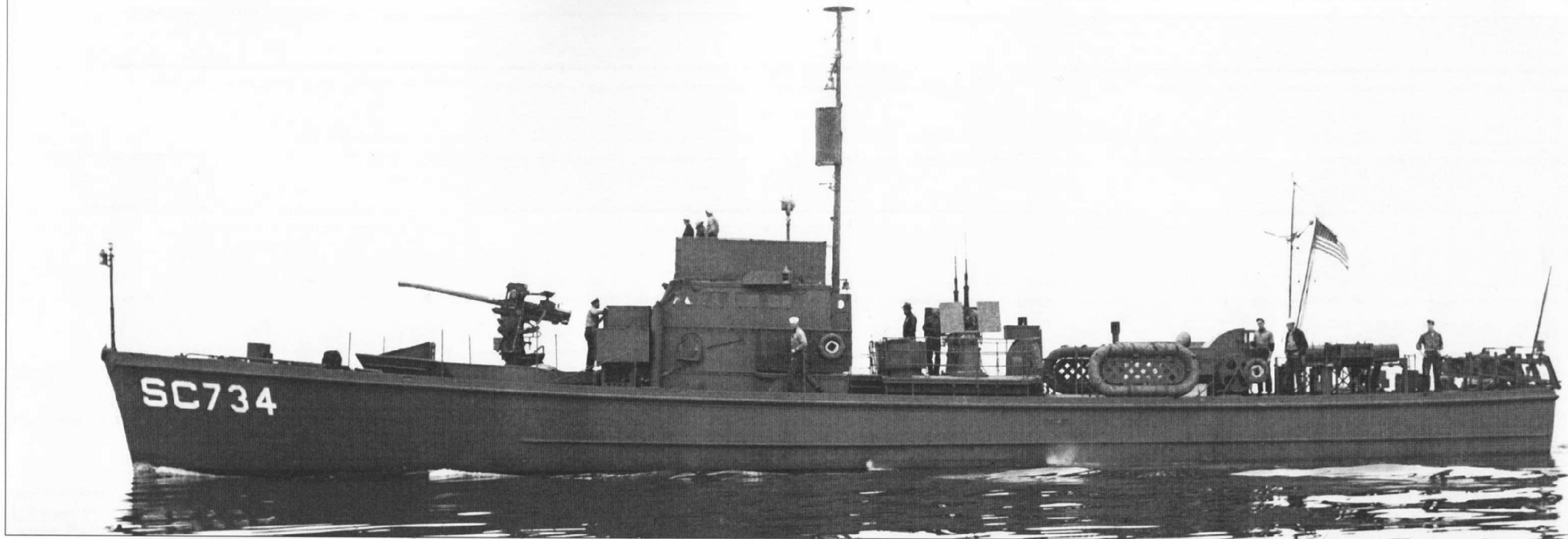


The typical late-war armament configuration of an SC appears on the SC-672 and consists of the following armament: a 40mm gun forward, three 20mm guns on Mark X mounts, and depth charges. She appears to be painted in overall Light Gray (5-L) or Haze Gray (5-H). (NARA)

The SC-722 appears here armed with a 3-inch/50-caliber deck gun forward and two 20mm guns on Mark IV shielded mounts with no depression rails. She appears to be in an overall Navy Gray (5-N). (NARA)







A 3-inch/50-caliber gun is mounted in the forward position on the SC-734, which still has no radar in this photo. She appears to be painted overall in Navy Gray (5-N). (NARA)

The SC-772 has a 40mm forward, and two 20mm guns installed abaft the pilot house. Like the 734, she appears to be painted overall in Navy Gray (5-N). (NARA)

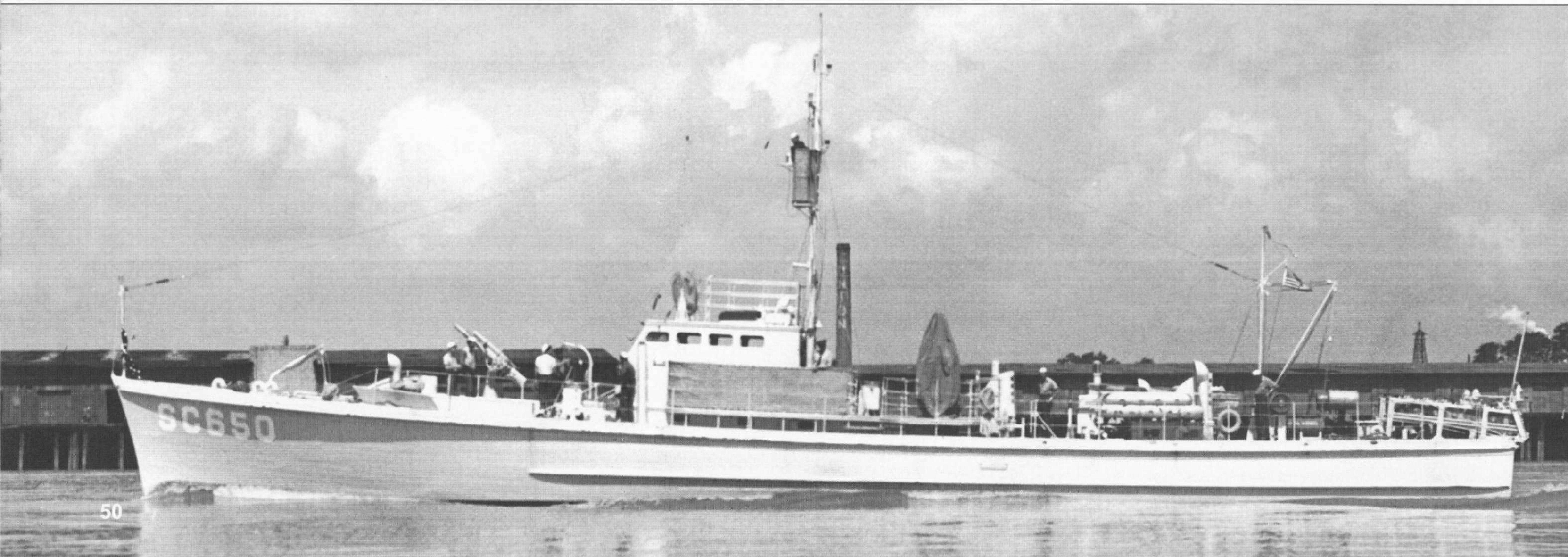






Just after her completion, the SC-670 appears to be painted in one of the pre-1941 Grays—Light Gray (5-L) or possibly a late-1941 Gray, such as Haze Gray (5-H). (NARA)

The SC-650, like the 670, appears to be in one of the pre-1941 Grays—Light Gray (5-L) or the late 1941 Haze Gray (5-H). Unlike the 670, the 650's hull numbers were painted in white. (NARA)







The SC-656, delivered to the Navy on 1 August 1942, wears Light Gray (5-L) or Haze Gray (5-H) during acceptance trials. (NARA)





The SC-648, which was delivered to the Navy on 1 July 1942, wears an overall Dark Gray (5-D) with its wherry painted white in this photo taken just after its completion. (NARA)





The SC-666 is painted overall in Navy Gray (5-N) early in her career. (NARA)

The SC-669 has a squarish canvas dodger atop of her pilothouse, and the 508 has a smaller rounded canvas dodger on top of her pilothouse. (NARA)

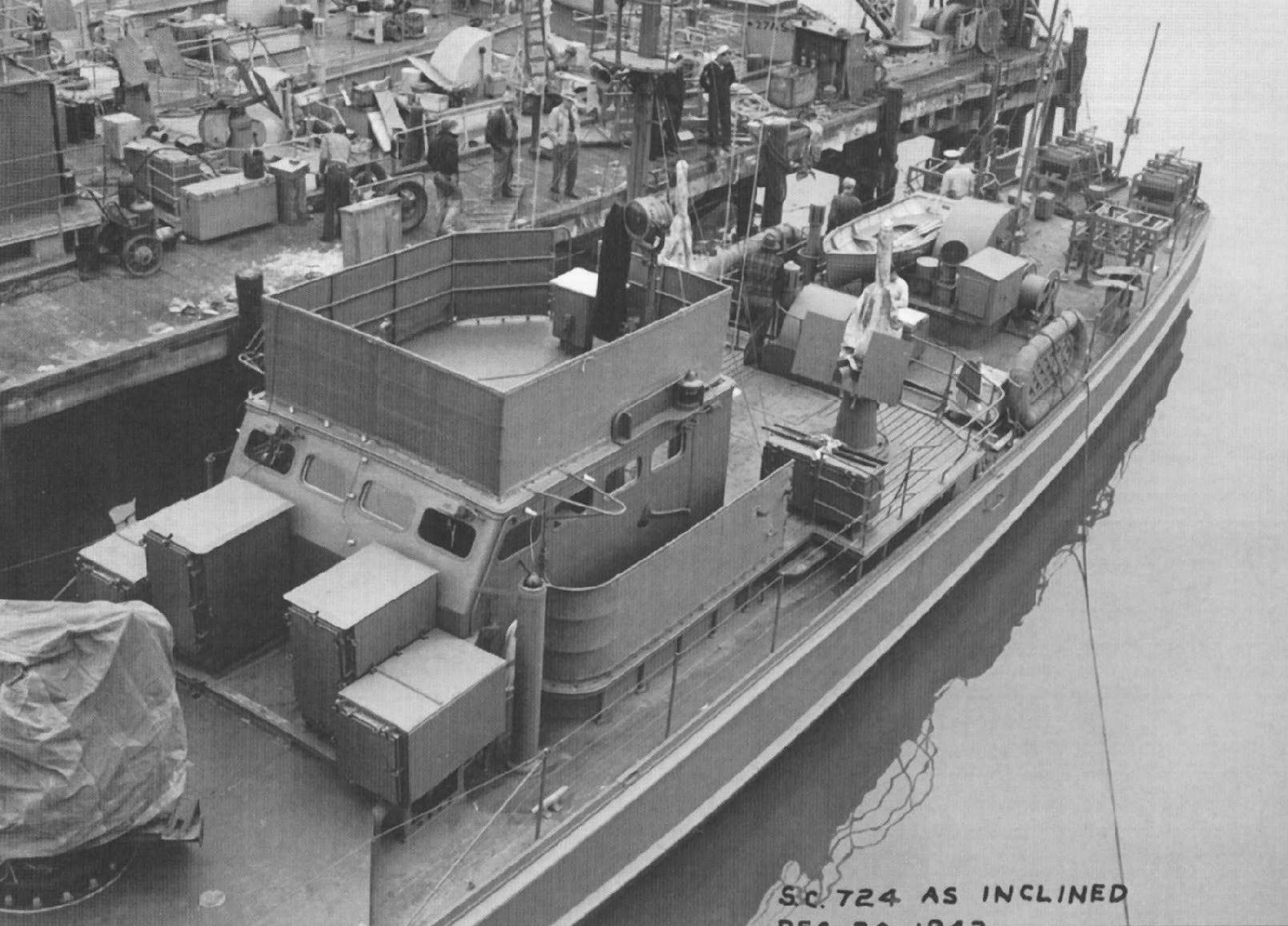


The SC-667 appears as a PC, before the point in 1942 when the Navy classified all 110-foot wooden-hull vessels as SCs and all 173-foot steel hull vessels as PCs. (NARA)

The SC-707 is seen during the war, apparently wearing Navy Gray (5-N) overall. (NARA)

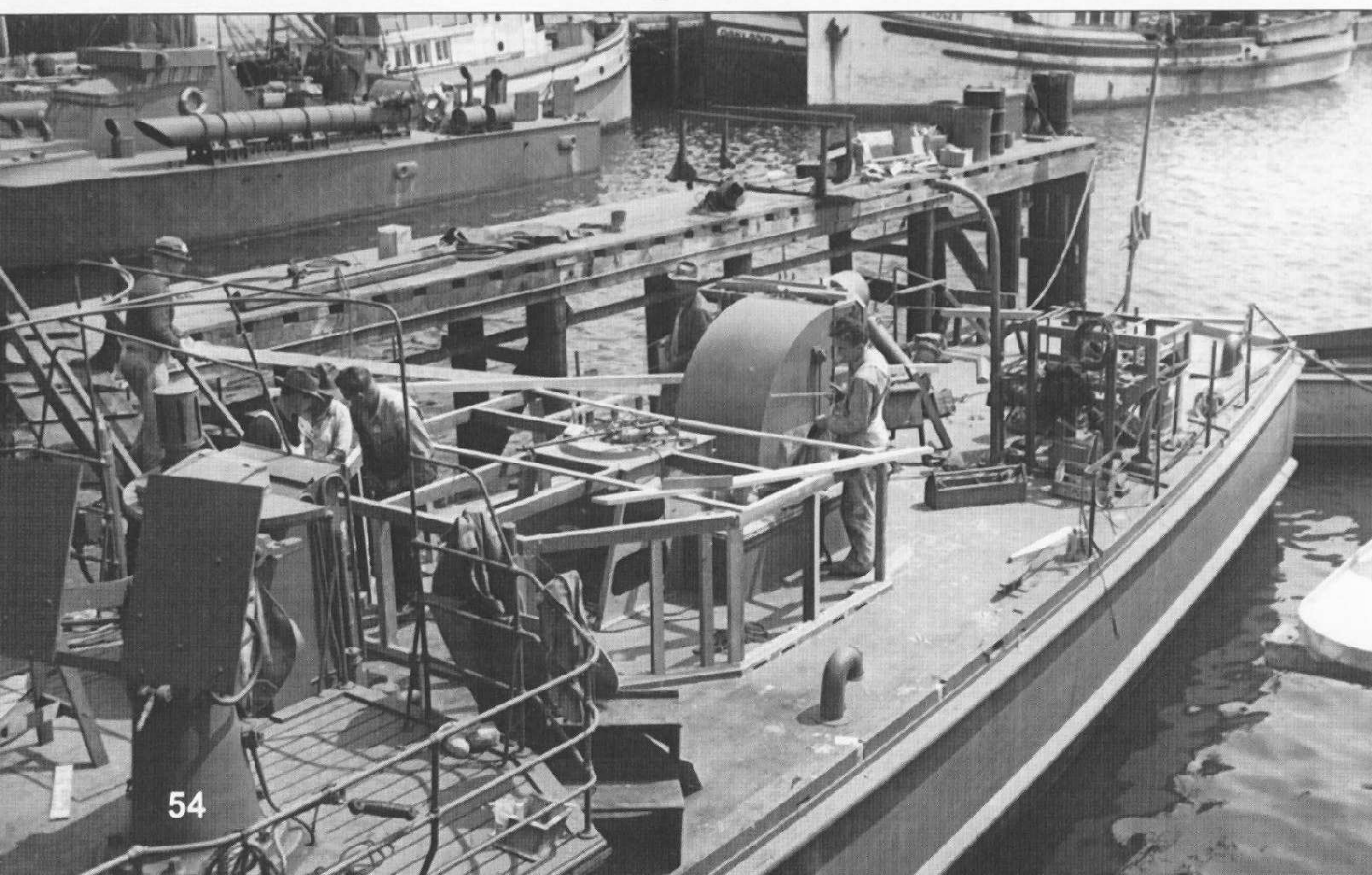






SC-724 is undergoing inclination tests at the builder's yard. The four lockers just forward of the pilothouse are ready-service lockers for both the 3-inch/50-caliber gun and the "Hedgehog" ASW rockets. (NARA)

The aft 'bandstand' for a third 20mm gun is shown here under construction. (NARA)



Two shielded 20mm guns on Mark IV mounts are visible in the amidships section of this SC. (NARA)

Rocket-launching rails are mounted on the foredeck of the SC-724. All SCs carried two different styles of anchor. (NARA)







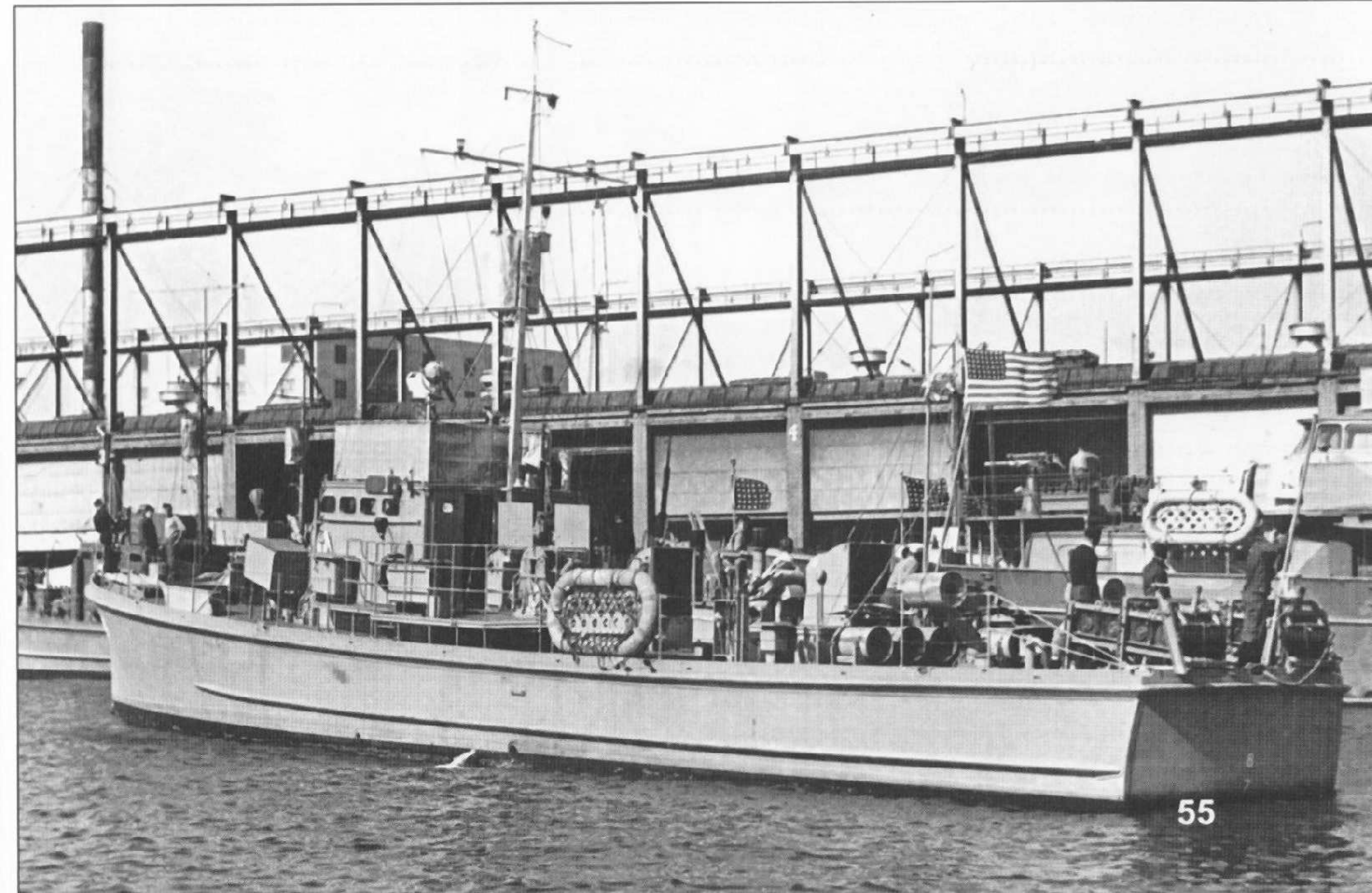
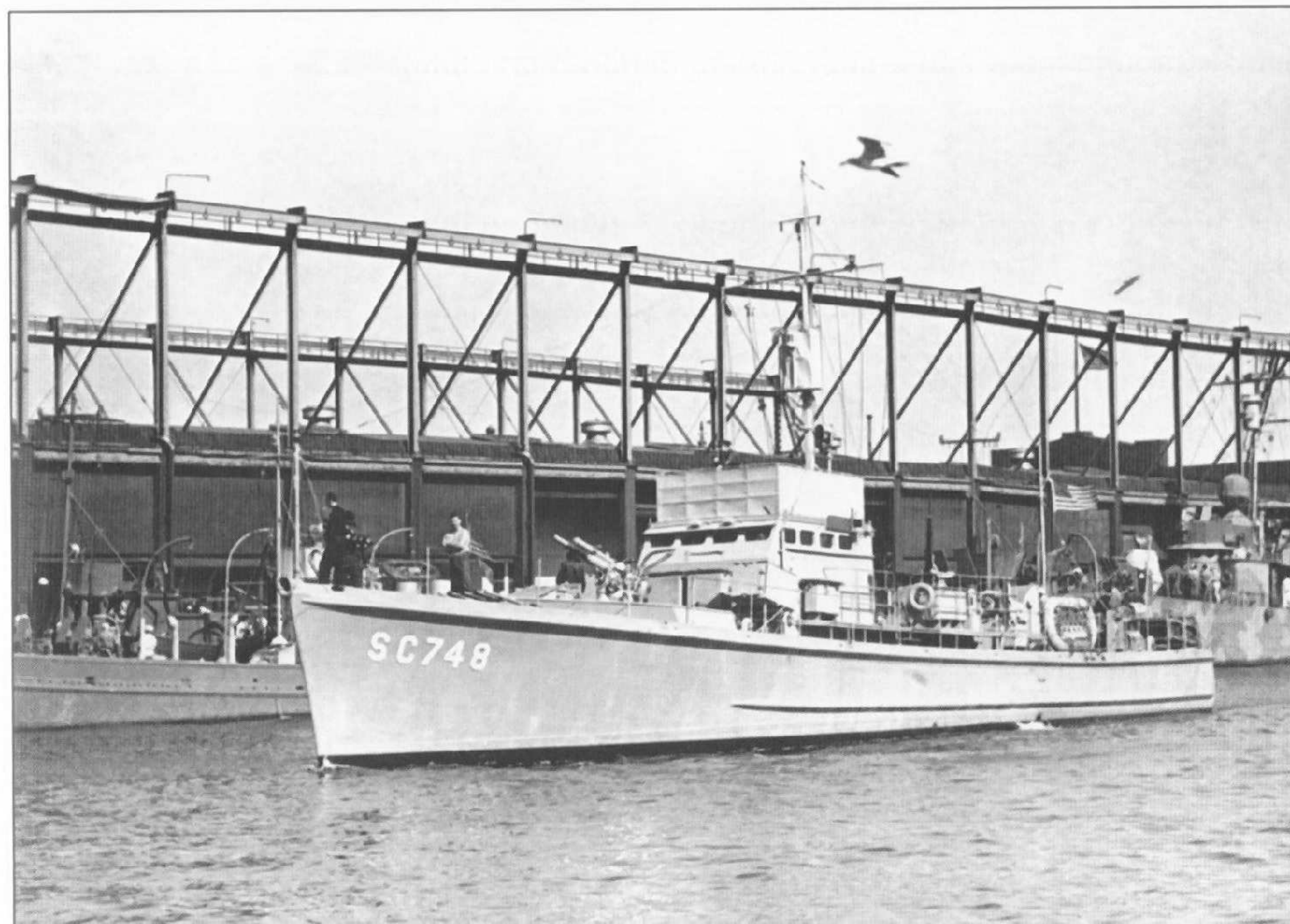
SC-738 is seen in what appears to be an overall Haze Gray (5-H) scheme with a 3-inch/50-caliber gun forward. Some SCs retained these guns until the end of the war. (NARA)



This starboard-quarter view of an SC shows the number of depth charges that the vessels could carry in their racks. (NARA)

The SC-748 appears to be painted in an overall Light Gray (5-L) scheme. (NARA)

A crow's nest can be seen on the mast of the SC-748. (NARA)







The SC-757 is being fitted out at the builder's yard. She is in what is considered to be the "ultimate" SC armament configuration. (NARA)

The depth charge arrangement on this SC differs from that used earlier. (NARA)



A large depression rail for the aft 20 mm gun is visible in this photo of an SC being fitted out in Michigan in the middle of World War II. (NARA)





SC 772-Completion Photo-3-27-43  
Dead in the Water - 45° from the Bow  
Taken off Newport Harbor Entrance  
The Benton Co. Newport R.I. 1943

The SC-772 after being completed in California in mid-1943. She is just missing her radar on top of her mast. (NARA)

The cluttered look of the deck of a SC is apparent in this view, which shows the tracks on the stern that ensured that the depth charges missed the hull. (NARA)



SC 772-Completion Photo-3-27-43.  
Dead in the Water - 135° from the Bow.  
Taken off Newport Harbor Entrance



S.C. 773 - Inclining Experiment

In this view, the launching rails for the 'Hedgehog' ASW rockets have been fully extended. (NARA)

The aft section of SC-773 is seen during her inclination tests. The bandstand for the aft 20mm is there, but the gun has not been fitted. (NARA)



S.C. 773 - Inclining Experiment





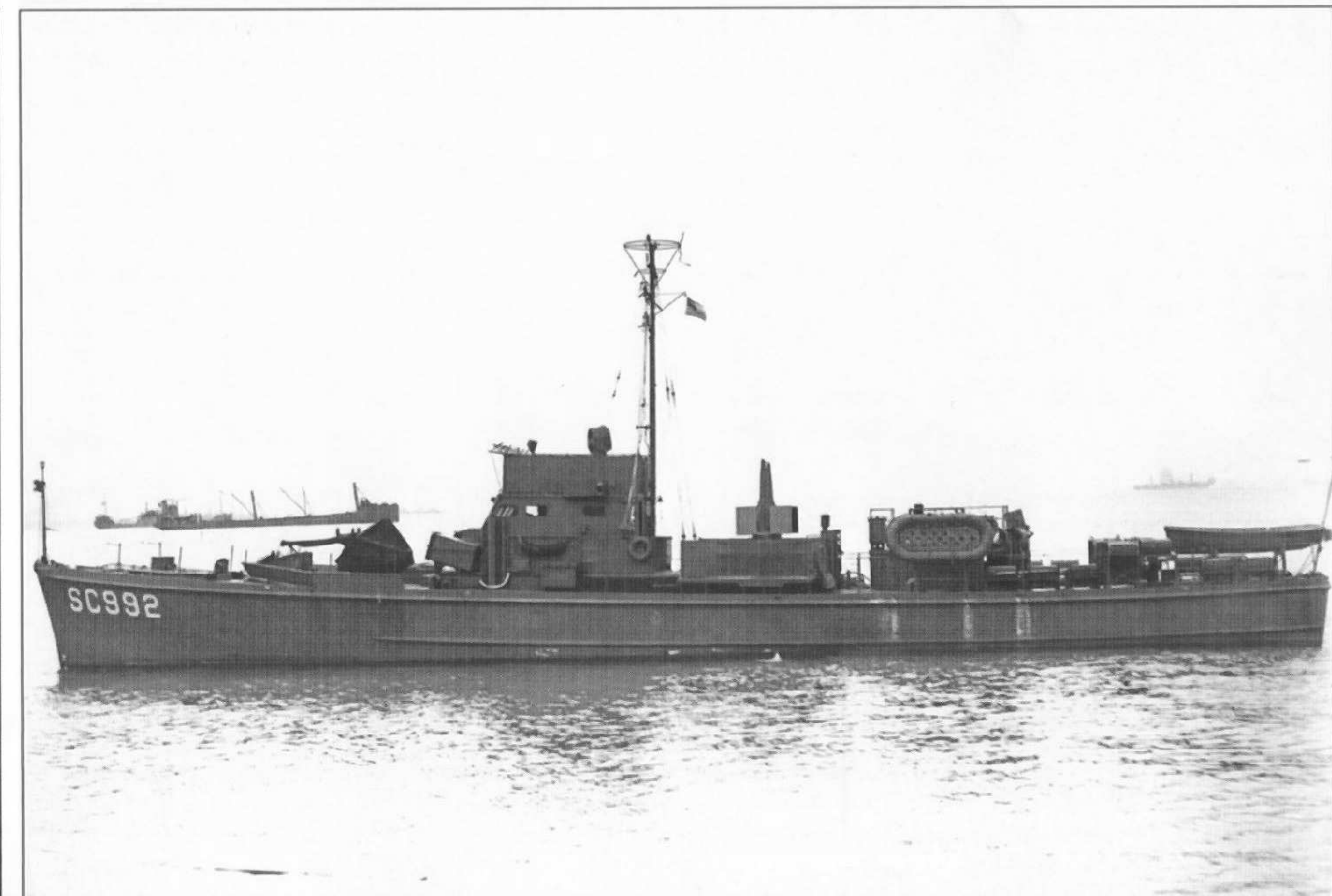
The SC-977 sails out of Norfolk Navy Yard in mid-1943. The circles on the photo denote improvements or additions, most notably the radar, the third 20mm gun, the depth charge racks aft, and the 40mm gun forward. (NARA)

SC-774 is seen undergoing builder's trials. (NARA)

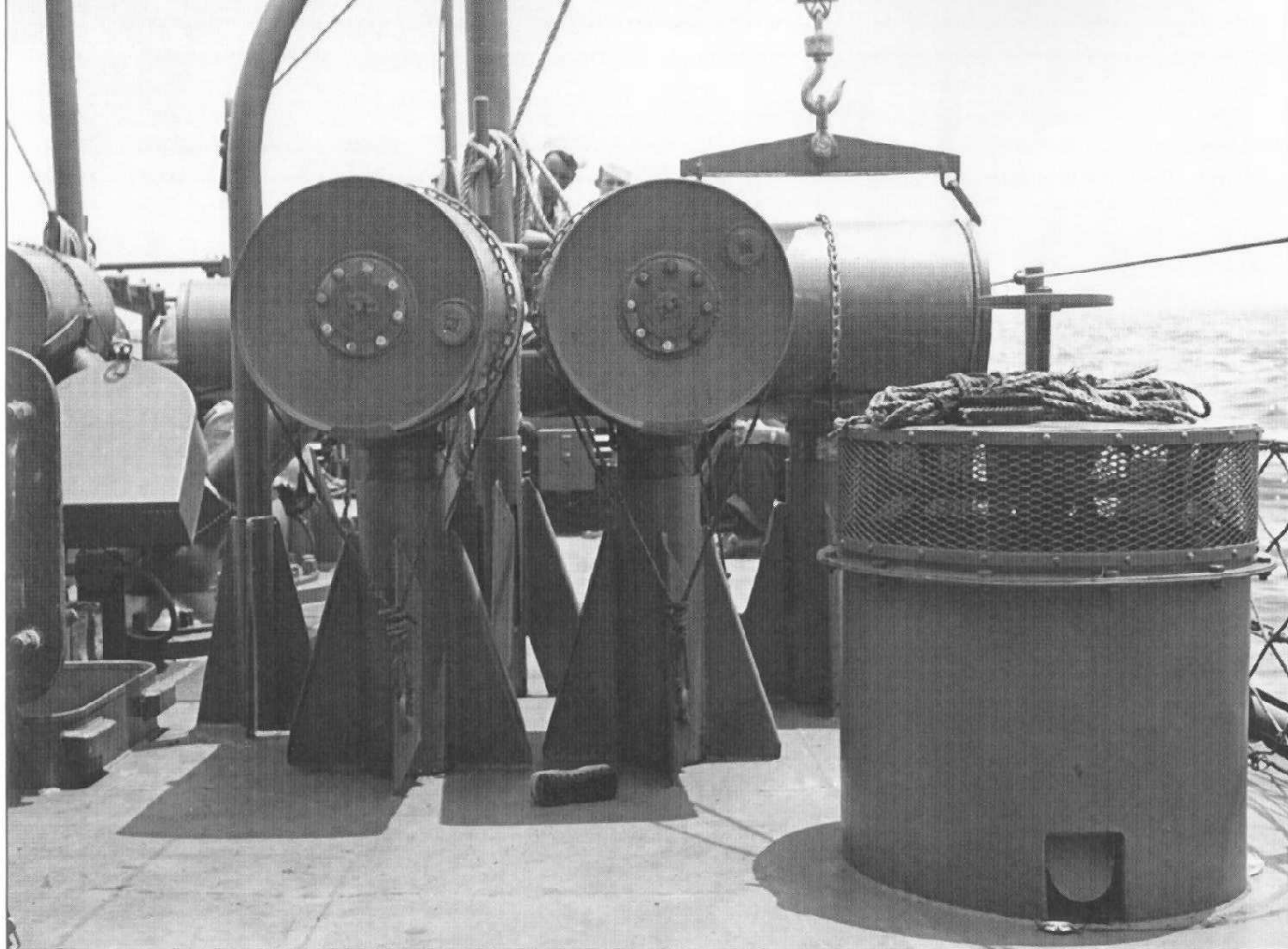


The SC-775 makes full speed off of the California coast, her radar not yet installed. (NARA)

The SC-992 is seen at idle. Her radar, third 20mm gun, and the depth charge racks on her faintail have yet to be added. (NARA)

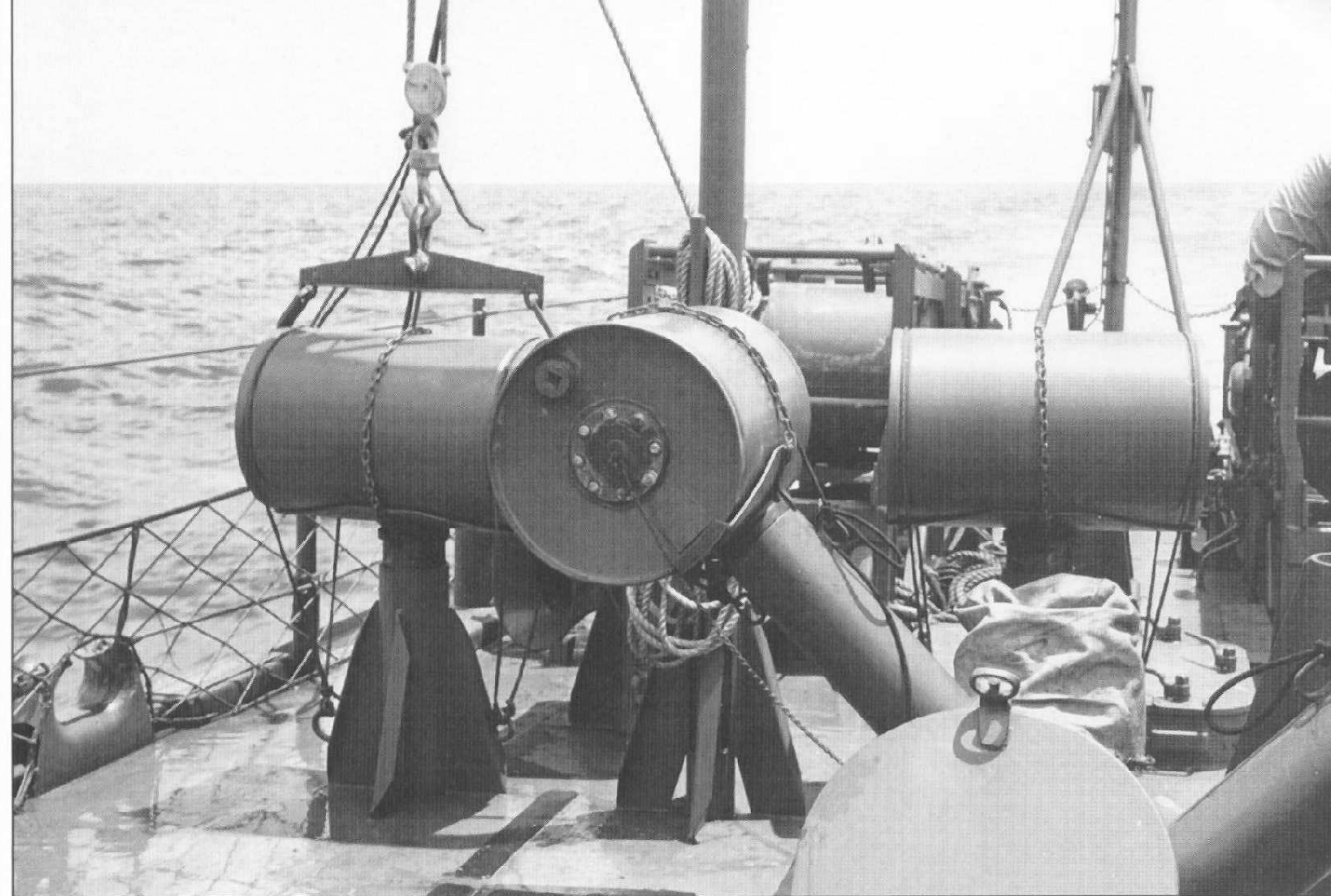






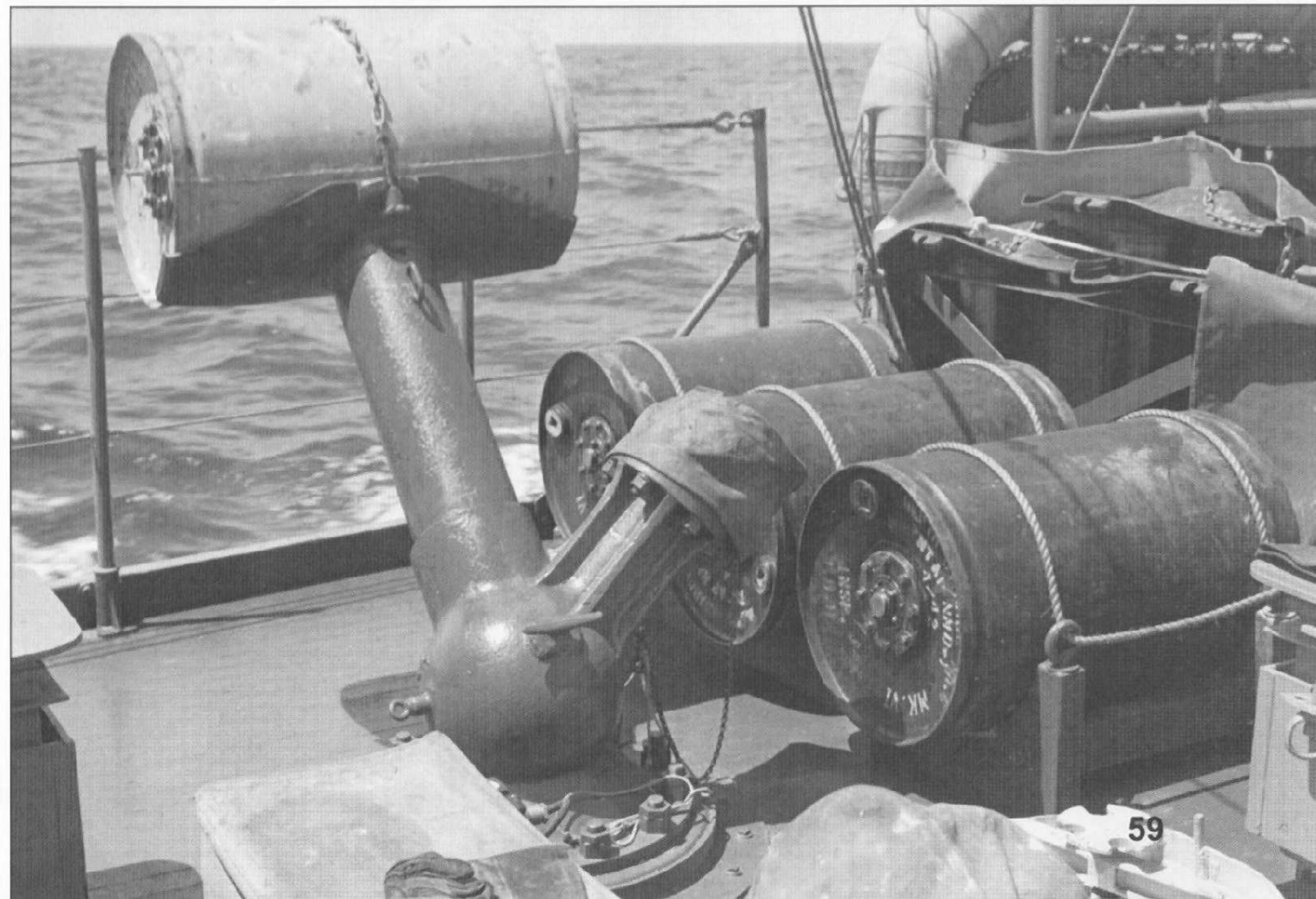
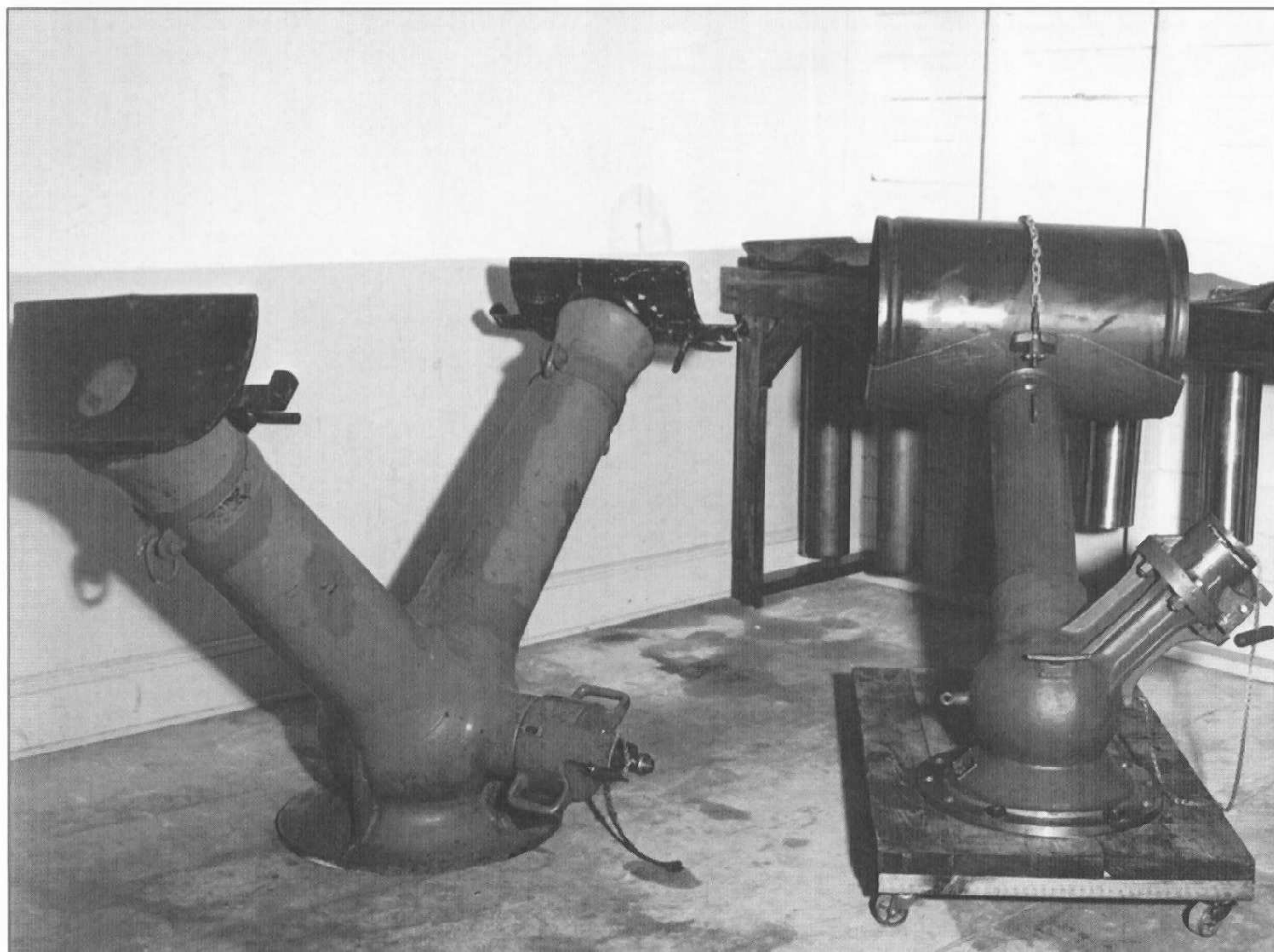
Depth charges are being prepared to be lifted into a K-gun on an SC deck. (NARA)

Depth charges fit onto the curved holders on the Y-gun and a K-gun. The guns propelled the charges away from the boat. (NARA)

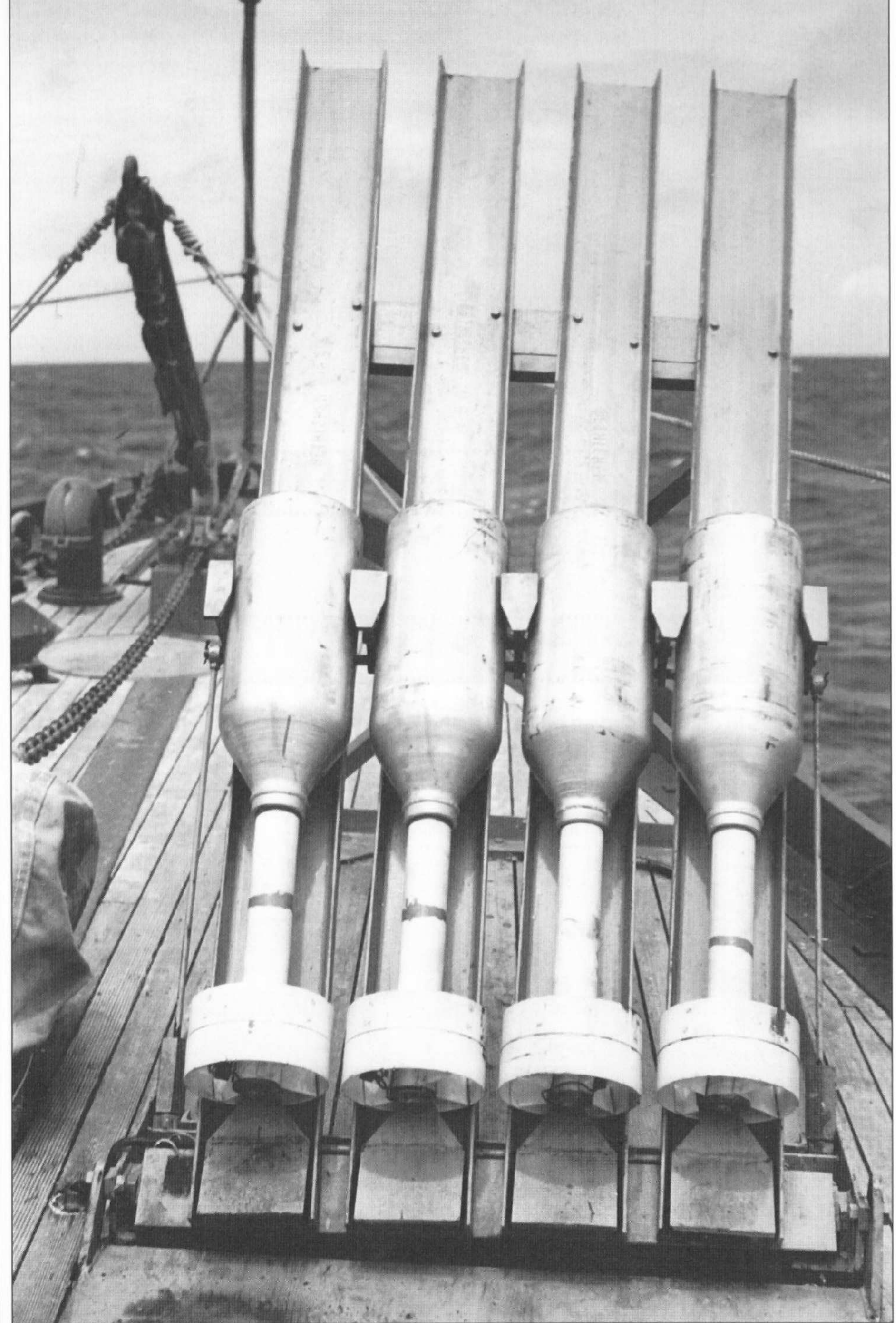
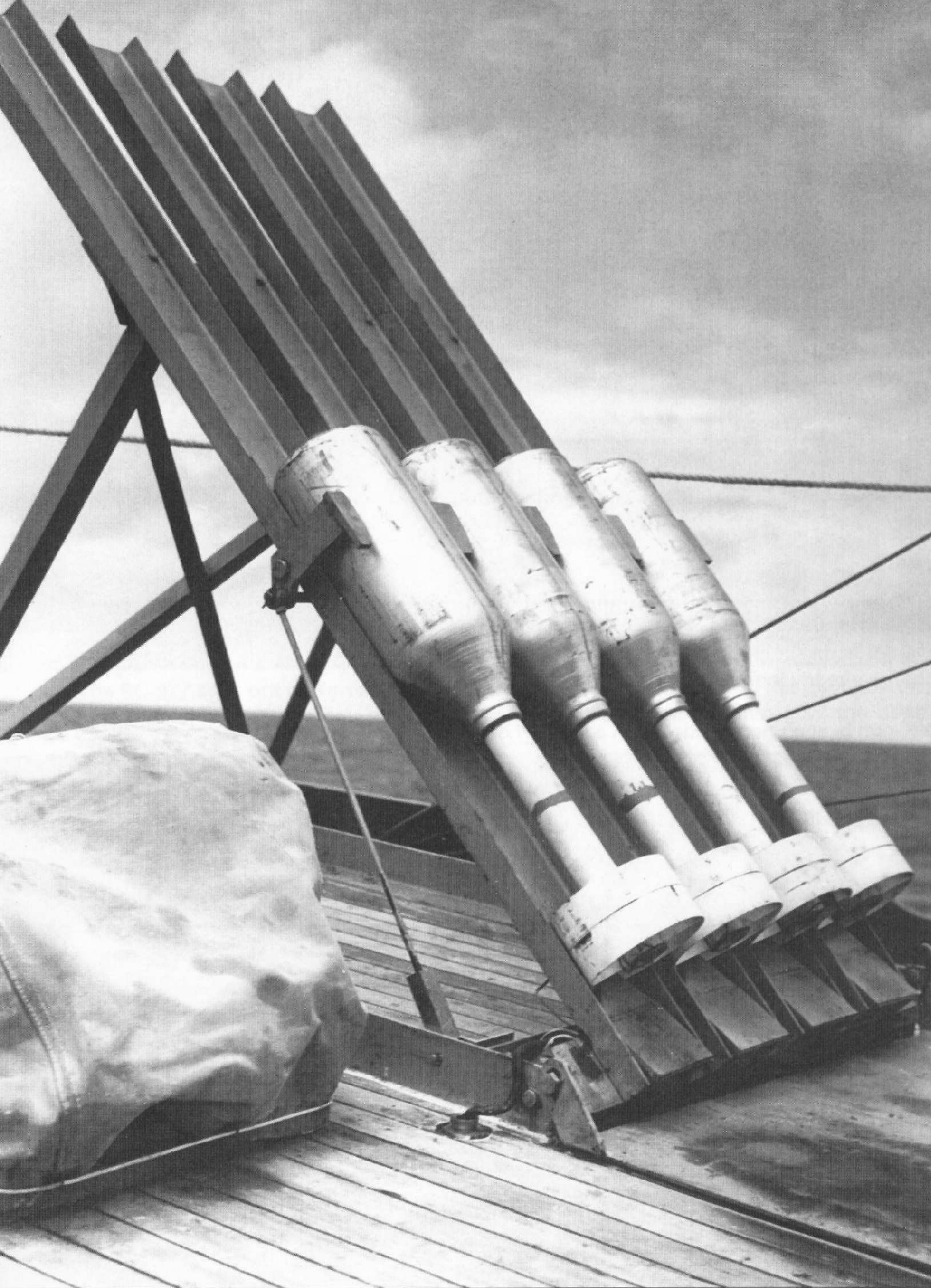


A Mark VI depth charge is shown in a sling, ready to reload the K-gun, once the depth charge already loaded on it is fired. (NARA)

A K-gun is seen here loaded with a Mark VI depth charge (NARA)







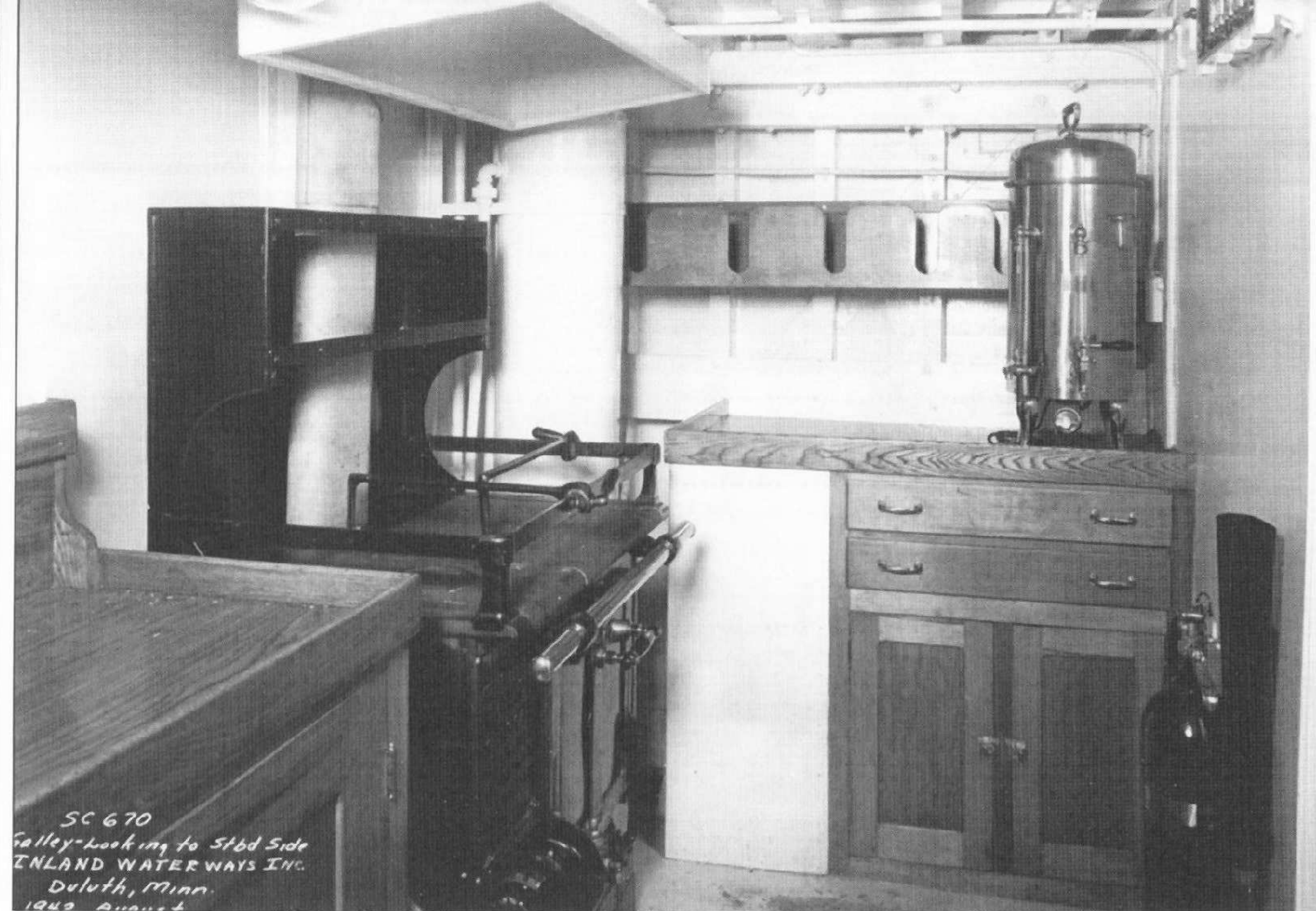
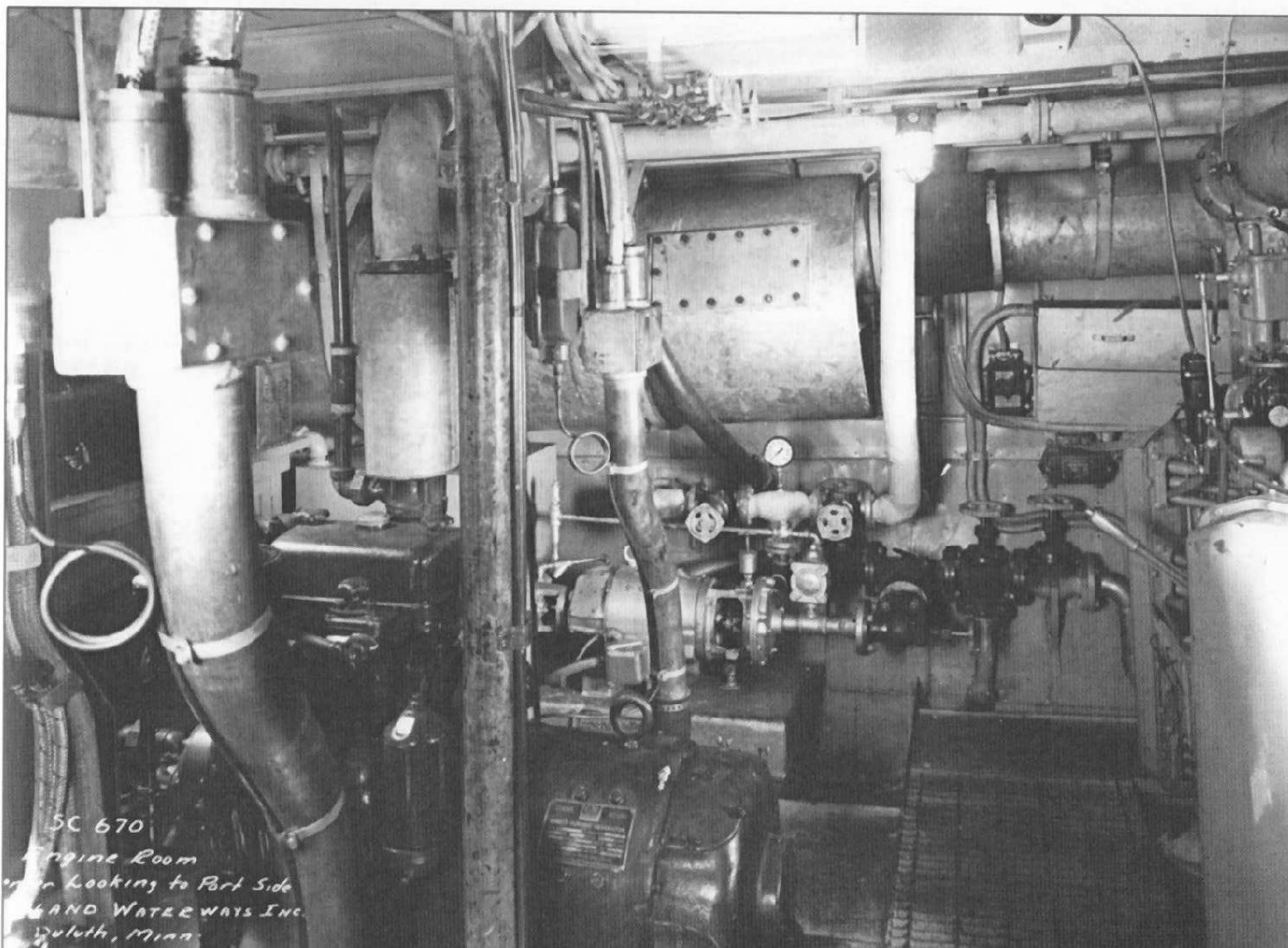
Subchasers in World War II carried "Mousetrap" ASW rockets. One set of rails was located on either side of the foredeck. (NARA)





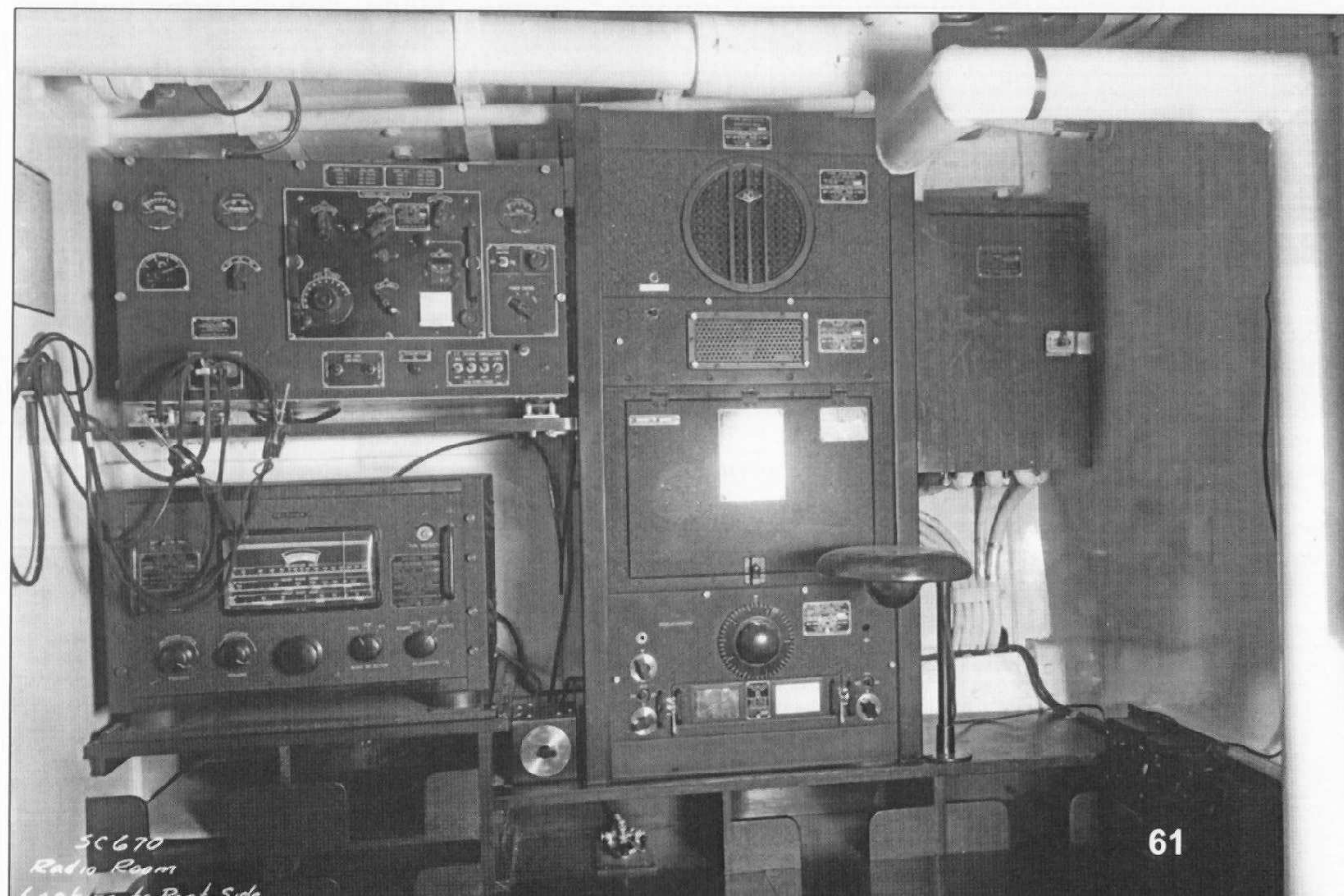
The Spartan interior of the SC-670's pilot house appears in this 1942 photograph. (NARA)

The port side of the engine-room on the SC-670 appears more complex than an engine-room in an SC-1 Class boat. (NARA)

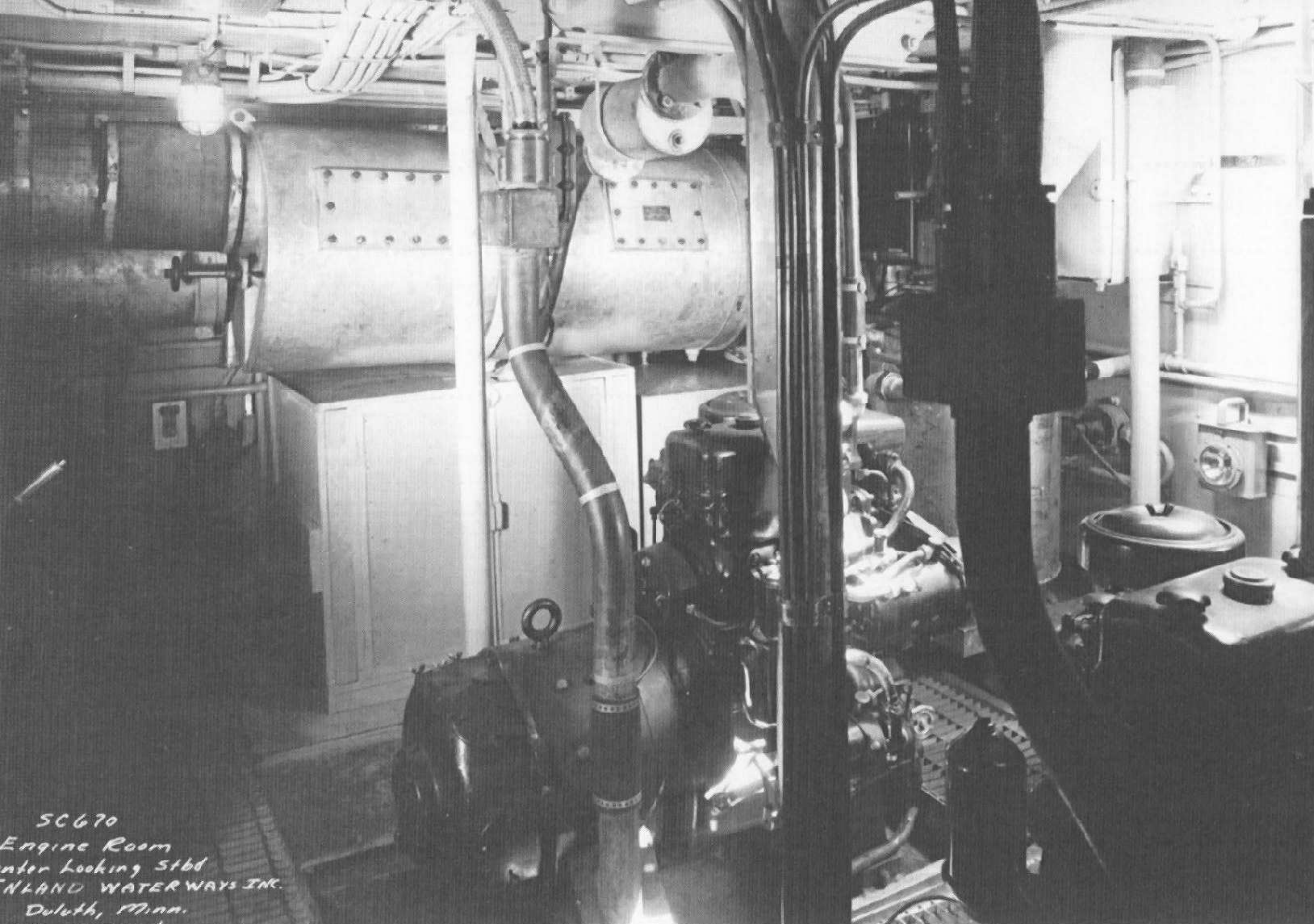


The galley aboard SC-670 would service the crew of 23-25 men on a typical two-week patrol. (NARA)

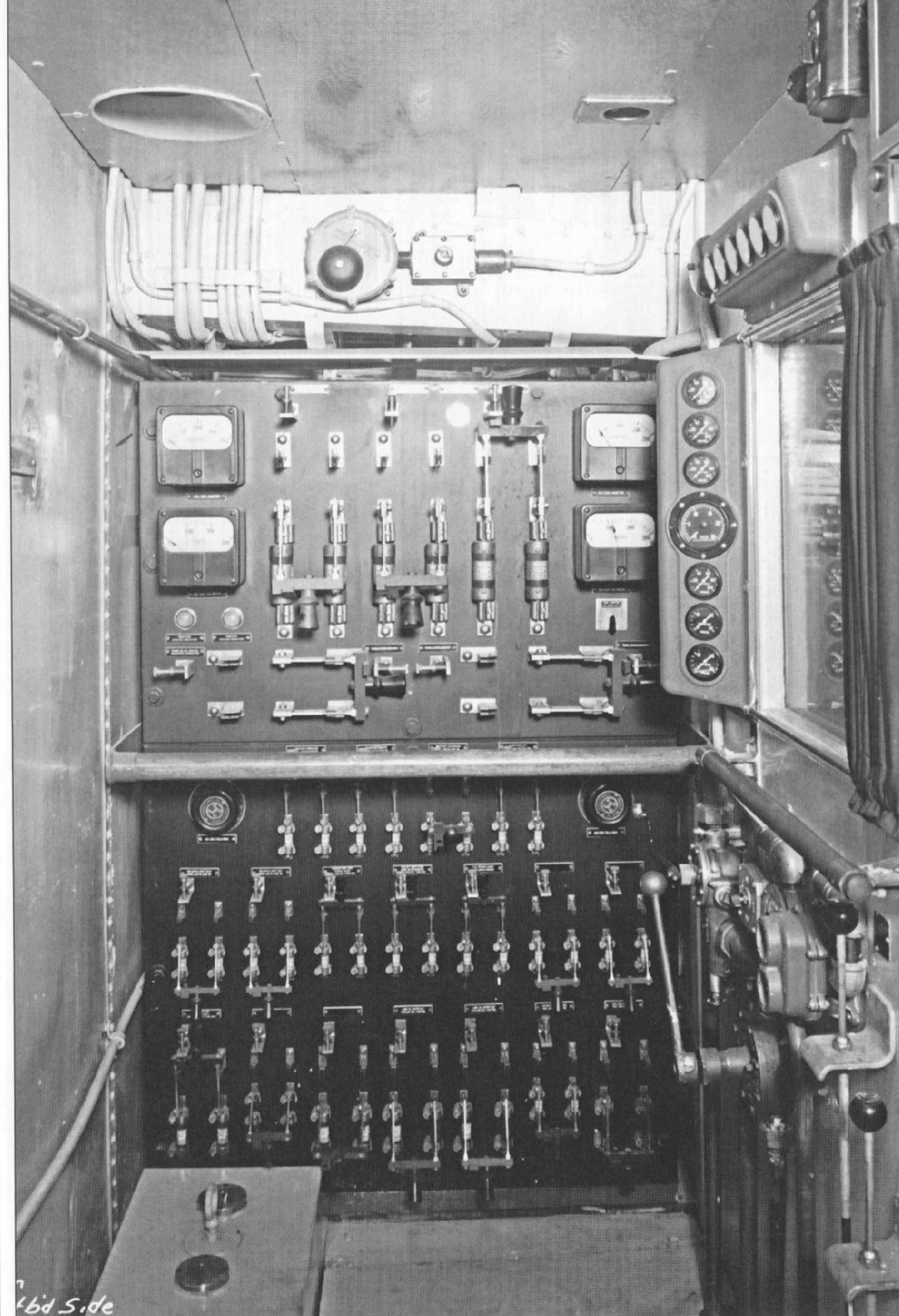
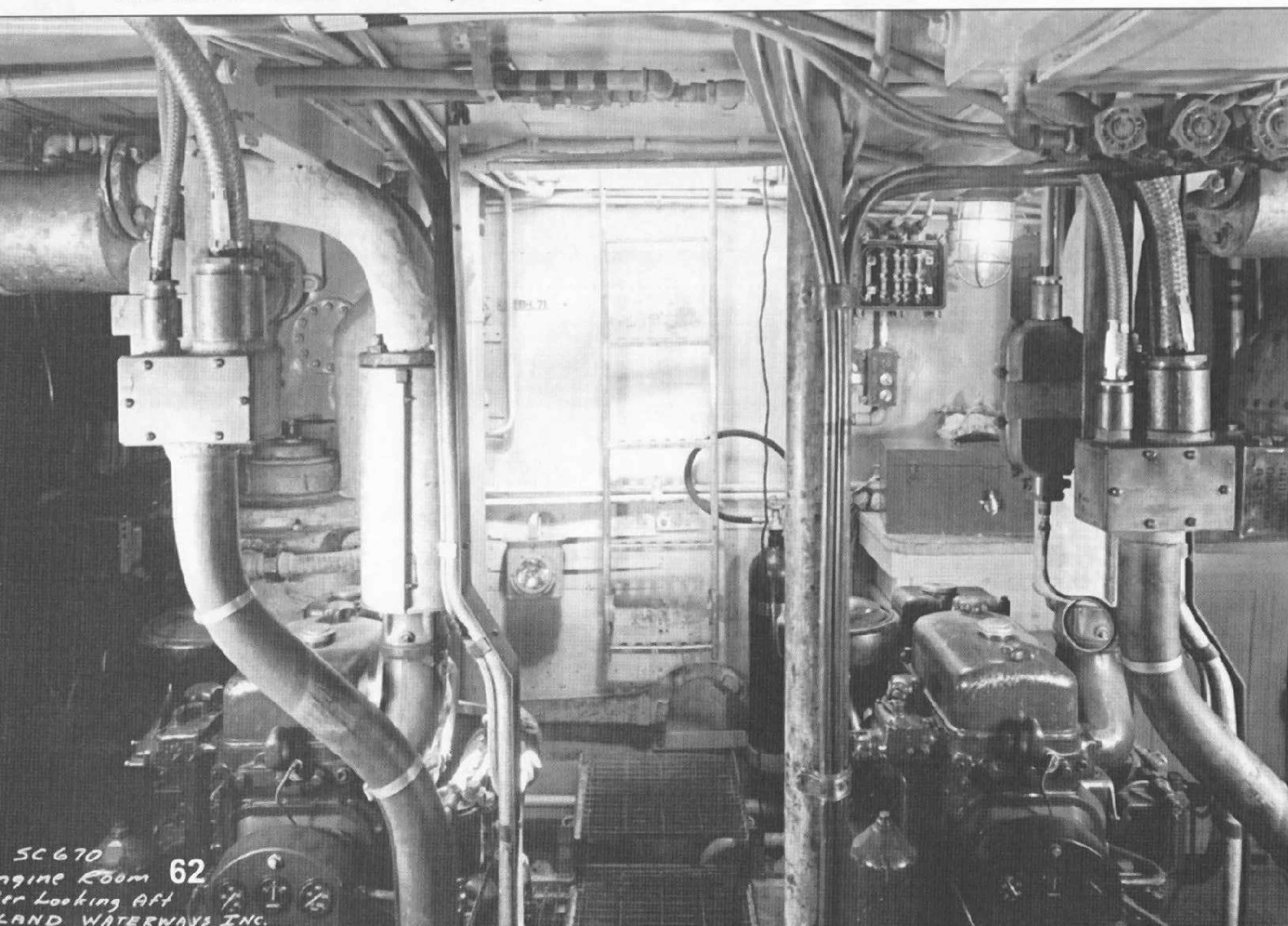
The port side of the SC-670's radio room is seen in this 1942 photo. (NARA)







Two photos reveal the view to starboard (above), and aft (below) of the engine room in a World War II subchaser. (NARA)



The control room on board a World War II subchaser was little more than a closet inside the vessel's engine room. (NARA)





SC-124 and two other SC-1 Class boats are in port next to two Royal Navy Destroyers. (Author's collection)

The SC-707 was an example of the SC-497 Class of World War II subchaser. (NARA)



A young lady christens the vessel that would become SC-699, the subchaser on which the author's father served on from late 1944 to early 1946. (NARA)



On 20 October 1944, American forces took back the island of Leyte in the Philippines, helping General Douglas MacArthur to keep his word, given in 1942, that he would return. The SC-991 served as the Inner Control Vessel during the landings, in the course of which she was credited with downing one "Betty" bomber and one "Val" dive bomber. At sea for a continuous 78 days, she also served as control vessel at Peleliu, rescued an American float-plane from a reef, and discovered a minefield and arranged to have it dismantled. The SC991 survived two typhoons and two collisions.

Twenty-three subchasers took part in the landings on Okinawa, suffering no losses, and

later went through Typhoon Louise that hit that island in October 1945. After the Japanese surrender, many of the SCs were turned over to the navies of the Philippines, China, and other countries around the world.

Like World War II PT boats, the SCs were designed for one task, but then proved themselves more than capable of fulfilling the many other responsibilities they were assigned and for which they were adapted. The men who served aboard the vessels expressed their feelings for the SC in words that have since become a watchword for their veterans' organization: "Too good to be forgotten."

**SC-449 was at a dock in Oracoke, North Carolina, in September 1944. She's armed with a 3-inch/23-caliber Poole gun on her foredeck, at least one 20mm gun, and depth charges. She is painted in Measure 12, which consisted of Navy Gray (5-N) from the waterline up to the deck level and Ocean Gray (5-O) with Deck Gray (20) decks. (NARA)**





ISBN 978-0-89747-587-7  
90000  
9 780897 475877

